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Overhead Lines.

THE paper that was read before the Institution of Electrical Engineers last week by Mr. W. B. Woodhouse, describing the work that has been carried out during the past four years by the British Electrical and Allied Industries Research Association on the strength of wood poles and the intensity of wind pressures, contains a number of valuable lessons, which we hope will be thoroughly learnt by those who are in a position to profit by them. Incidentally, the results obtained have been communicated to the members of the Association from time to time, and some of them have thus already been turned to good use; this fact, as Mr. Woodhouse pointed out, explains why some of the conclusions now published may at first sight appear to have been forestalled. The moral is obvious: become a member of the Association, and "get in on the ground floor," so to speak.

That is a purely personal and private view of the matter, to which no exception can be taken, but there is another aspect of it to which the Director of the Research Association, Mr. E. B. Wedmore, drew attention in the course of the discussion, and which we wish to emphasise as strongly as possible—namely, the immense importance of work such as this to the whole industry, and even to the nation—work which involves a comparatively trifling investment, and pays for itself many times over within a very few years. It is hardly conceivable that so profitable an undertaking should be starved for want of adequate support on the part of those who stand to benefit immediately and abundantly by its products; yet we are assured that the researches which have now been described were contemplated, and could have been made, in the earliest years of the Association's existence, but for lack of funds. Moreover, the results already obtained have indicated the necessity for further research on lines that bid fair to be equally fruitful, but progress is hampered by the same crippling penury.

It will not have been forgotten by our readers that, a few years ago, the results of a similar research on buried cables were declared, and admitted on all hands, to have made possible economies which were valued in terms of millions of pounds. This country is now embarking on fresh expenditure totalling over 30 mil-

lions sterling, for overhead lines, switchgear, and transformers; if research were able to effect a saving of so little as 1 per cent. of that outlay, it would put £300,000 in the national pocket, whilst it would probably cost but a tenth of that sum. But the results recorded in the paper before us are sure to effect a far greater economy than that, and there is good reason to believe that a saving of quite 10 per cent. is possible. Surely it is worth spending £50,000 or £100,000 to save £3,000,000?

The matter is one which most intimately concerns not only electricity supply authorities in general, but above all, the Central Electricity Board, which is responsible for the huge outlay we have mentioned in particular. It may be the fact that the Board has no statutory power to subsidise research, but it certainly bears the obligation to carry out its work as economically as possible, and it should not be beyond the capacity of its advisers to find a way to overcome obstacles. On the other hand, the Electricity Commissioners are explicitly authorised by the Act of 1919 to carry out "experiments or trials for the improvement of the methods of electric supply" and to incur expenditure for that purpose. They are our leaders, and we suggest that, in view of the importance of the matter and the large sums at stake, the industry should look to them to take strong and definite steps to ensure that the aid of research shall be invoked for the great works that they have in hand. The electricity supply authorities also ought, in their own interests, to see to it that work which will immediately and substantially reduce their capital expenditure shall not be left undone for want of financial support. The whole outlay required to carry out the programme of research outlined by the Research Association is but a trifle compared with the aggregate annual capital expenditure of the electricity supply industry.

Another of the lessons to which we have referred is the necessity of carrying out experiments under practical conditions. The tests on wooden poles described by Mr. Woodhouse were made with poles set in the usual way at the time, and the extremely interesting kinematograph views which were shown at the meeting strikingly demonstrated the inadequacy of that method of pole-planting—in every case the pole was stronger than the foundation. The experiments described in Mr. Christopher Wade's well-known paper in 1907, on the other hand, were made with a practically rigid support for the base of the pole; consequently the results of the two series were very different, but when firm foundations are used, Mr. Wade's data hold good. The singular thing is that in all these years it had not been appreciated that the strength of the pole was far in excess of that of the foundation—yet poles were rarely uprooted, and the natural inference, which was drawn by Mr. Woodhouse and emphasised by Major T. Rich at the meeting, is that the poles used in accordance with the Regulations are far stronger than they need be to cope with the stresses to which they are subjected. This is a fresh argument, with an enormous weight of experience to back it, in favour of the relaxation of the Regulations regarding the size of poles, even if the foundations were not strengthened.

Industrial Lighting.

A useful supplement to the campaign for better factory lighting, now proceeding, has been the series of meetings in Birmingham (October 22nd), Manchester (October 29th), Newcastle (October 31st), and Glasgow (November 1st) organised by the Illuminating Engineering Society. At each of these gatherings Mr. J. L. H. Cooper's paper, entitled "An Investigation of Electric Lighting in the Engineering Industry," which had previously been read before the Society in London, was presented *de novo*, and at each of the four meetings a short introductory address summarising the aims and objects of the Society was read. This was, we believe, the first occasion on which the Illuminating Engineering Society extended its activities to the provinces, and it has reason to be satisfied with the results of the new departure. At Birmingham, where Mr. R. A. Chattock presided, the assembly room of the Chamber of Commerce, which holds about 300, was almost completely filled. At Manchester and Newcastle the rooms barely served to accommodate the audiences, and at Glasgow there was also a good attendance and an enthusiastic meeting. A pleasing feature at several of the gatherings was the presence of professors attached to local universities. At Birmingham, Prof. W. Cramp opened the discussion. At Glasgow useful contributions were furnished by Professor G. W. O. Howe and Professor S. Parker Smith, and Professor Magnus MacLean presided. Whilst local electrical engineers naturally formed a substantial proportion of the audiences, there were also encouraging indications of interest in factory lighting on the part of those associated with other large local manufacturing concerns. This was particularly noticeable at the meeting in Newcastle, over which the Hon. Sir Charles Parsons presided. The introductory addresses delivered by Mr. D. R. Wilson, Lt.-Col. C. H. Silvester Evans, Mr. J. Eck, and Mr. J. S. Dow included an invitation to local engineers and others to join the Illuminating Engineering Society. We hope that the invitation will meet with an encouraging response, for it is all to the good that leading provincial cities should contain a nucleus of members in close touch with the useful educational work which the Society is doing in the cause of "better lighting."

New L.C.C. Regulations.

At a meeting held on October 30th. the London County Council received and adopted a report of the Theatres and Music Halls Committee, on revised regulations for places of public entertainment, in which the wiring regulations of the Institution of Electrical Engineers (9th edition) are now incorporated, with provision for the inclusion of amendments to the latter that may be made from time to time. Nowhere more than in such places, where large numbers of people are massed together, is it necessary to insist on the most careful precautions to ensure freedom from the risk of fire or panic, the terrors of which need no emphasis; with this in mind, no doubt, the Committee has excluded many practices which are permitted by the I.E.E. code, such as the use of lead-sheathed or tough-rubber-insulated wiring, or of auto-transformers, and does not approve of any relaxations in the case of "extra-low-pressure" installations.

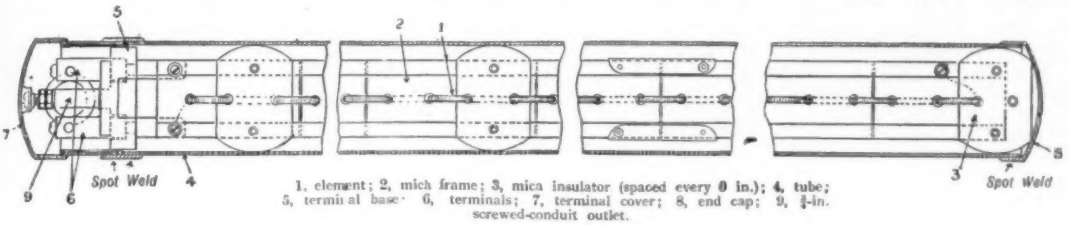
The maternal solicitude of the Committee for the safety of the public is praiseworthy, but caution may be carried to extremes and become grandmotherly; in spite of all precautions, someone may drop a cigarette or a lighted match and short-circuit all the regulations. The Council, not content with the I.E.E. rules, has superimposed a number of its own, such as the rating of switches in frequent use 50 per cent. higher than the maximum current controlled, and the requirement that bell and telephone wires, &c., shall be installed as though intended for lighting and power, if the pressure used exceeds 12 volts; radiators "and other current-consuming devices" are not to be installed without written permission!—and must be securely fixed in position. The heating system is to be hot water or steam—though a foot-note grudgingly admits other methods "for heating certain parts of the premises . . . . subject to special conditions," and electric passenger lifts are not to be installed, except in positions approved by the Council.

There is no appeal from the regulations, which the Council has absolute power to make and enforce. It is to be hoped that its elaborate super-code, which covers nearly eight large pages, will be administered with discretion and common sense; otherwise it will impose new and unnecessary burdens upon an industry which is already overloaded with rules and regulations and Acts and schedules.

A Large Heating Installation.

An electric office-heating installation which has recently been carried out at West Bromwich employs low-temperature tubular heaters, with a total loading of 116 kW, and is automatically controlled between 59 and 62 deg. F.

A LOW-TEMPERATURE electric heating installation which has recently been completed at the new offices of Messrs. Kenrick & Jefferson, Ltd., West Bromwich, is of unusual interest and probably unique, at any rate as far as this country is concerned. The offices are contained in a four-storey building which has a frontage of 111 ft. and a maximum width of 50 ft. There are four main rooms which occupy nearly the whole of the frontage each, and are 39 ft. wide. The total volume of the building is 175,000 cubic feet.



1, element; 2, mich frame; 3, mica insulator (spaced every 6 in.); 4, tube; 5, termi al base; 6, terminals; 7, terminal cover; 8, end cap; 9, ¾-in. screwed-conduit outlet.

Fig. 1.—Construction of "Unity" Heater; Section.

Fig. 2.—Third-floor Office, showing Tubes and Thermostat.

The installation was designed by Dr. R. D. Gifford, A.M.I.E.E. (chief engineer to Messrs. Kenrick & Jefferson), to whom we are indebted for his assistance in obtaining the following information and the photographs.

Electric heating was decided on as against coke heating for a number of reasons, including insufficient accommodation for the necessary extra boiler, the very long runs of piping that would have been necessary to have reached the building, and the great advantages that can be obtained by the automatic control of electric heating. The cost for electric heating was estimated at £240 per annum, as against £166 for coke heating, with the necessary attendance. These figures were based on a heating season of 900 hours.

The system, which is designed to give a temperature in the rooms and on the landings of at least 60 deg. F. when the external temperature is 32 deg. F., and with 2½ changes of air per hour, employs "Unity" tubes supplied by Messrs. Young, Osmond & Young, Ltd. The tubes have welded steel containers, are 2 in. in diameter, and vary in length from 5 ft. in the cloak rooms to 16 ft. in the main offices. The loading is about 60 W per ft. The construction of the tubes is indicated in fig. 1. There are in all 142 tubes in the building, totalling about 1,815 ft. in length. The total loading for the complete installation is 116 kW, and the supply system is three-phase, 400 V, 50 cycles. There are five main circuits, one for each office, that is, one for each main room on the ground, first, second and third floors, and one for the staircase and landings. The loading for the ground-floor office, which has a ceiling height of 14 ft. 6 in., is roughly 29 kW; the first and second floors, where the ceiling height in each case is 10 ft., have loadings of 24 kW; and the third floor is loaded at 29 kW. In the last mentioned case the ceiling height is also 10 ft., but there is a flat roof exposed to the outer atmosphere; the higher loading is therefore necessary to compensate for the exterior radiation. It should be mentioned that in each office circuit are included the tubes in the cloak rooms, and so on, on the same floor.

In the main rooms the tubes are arranged in two tiers around the walls, placed at 8 in. and 15 in., respectively, below the window sills, the lower tubes being 21 in. from the floor. The tubes are thus high enough to prevent their damage by persons attempting to stand on them, but are suitably positioned to counteract the down draughts from the windows. For the staircase, where there is practically a clear path for the whole of the warm air to rise to the top floor, the uniformity of the loadings and the arrangements of the tubes in the offices had to be departed from, and the loadings vary from approximately 5 kW on the ground floor to 0.8 kW on the third floor. The total loading for the landings is about 10 kW. On the ground-floor landing or main

Fig. 3.—Entrance-end Corner of Upper Office.

entrance there are two groups of five tubes each, arranged horizontally one over the other, but out of view; the tubes are each 7 ft. long. Each main circuit is supplied through one set of main fuses on the control board, and the mains come up to sub-fuse-boxes of the flush type, in which the circuits are sub-divided so that

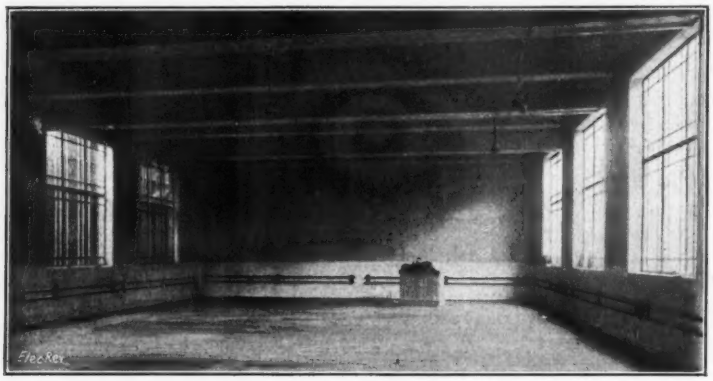


Fig. 4.—Apparatus in Ground-floor Main Room.

one-third of the load of the circuit is supplied from each phase and neutral (230 V). Balancing is thus obtained on each floor. Figs. 2 and 3 are views of the third-floor office, and fig. 4 is one of the main room on the ground floor. A point of interest is the apparatus in the cloak rooms, one of which is shown in fig. 5. In addition to tubes placed along the bottom of the walls, there are short runs bracketed to the centrally placed clothes racks for drying purposes.

The installation is automatically controlled by thermostats, one of which is placed in each main room, some-

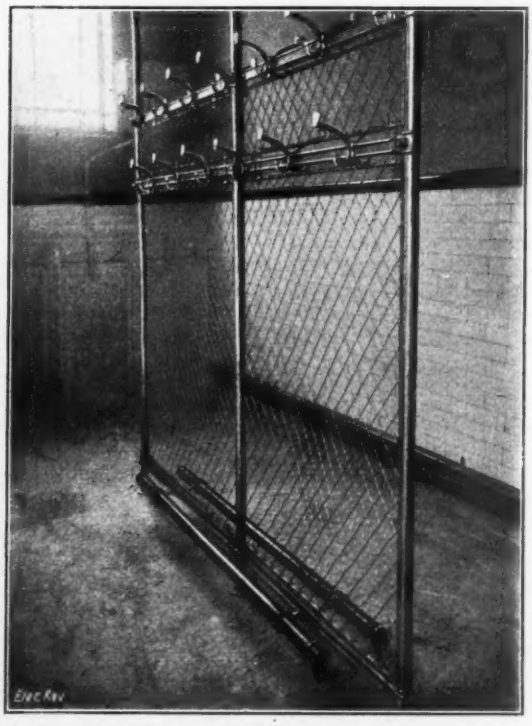


Fig. 5.—Cloak Room, showing Clothes-rack Heaters.

where near the centre of the rear wall, fig. 2, left. The thermostats are of the tubular type, and are adjusted to make contact at 59 and 62 deg. F., thus giving a mean temperature of 60.5 deg. F. On making contact, each thermostat starts up a specially designed motor-driven quick-break switch. This switch is of the rotary type, with the motor carried inside the drum, and the motor runs in the same direction for both switching operations. Fig. 6 shows the control board during the stages of erection. Two of the motor-switch units only are shown in position, bottom left. Provision is made on the board for a sixth circuit to be added at a later date. The supply tariff for the installation will be ½d. per kWh, with no maximum demand, but with the stipulation that between 4.15 and 5.15 p.m. from November 15th to January 31st the supply shall be cut off. The supply is taken from the mains of the West Bromwich Corporation, and a time switch and contactor panel have been installed to cut-out the installation during the times specified. The possibility was seen, however, of the offices reaching the lower temperature limit at the same time as the Corporation switch cut the supply off, and to guard against that a row of tumbler switches, shown in fig. 6 under the control board, has been arranged so that each will cut out the thermostat control and operate the corresponding drum switch. By this means a boosting heat of a few degrees can be given to the offices before the supply is cut off.

Beside each thermostat is a pilot lamp, fitted with a semi-flush-type Holophane reflector, which is easily visible from any part of the room, and will be used to obtain a record of the hours the circuit is "on" during any season. It will be appreciated that the ideal method of obtaining the statistics from a recording instrument was hardly a practicable proposition.

The wiring throughout the installation is v.i.r. cable run in screwed conduit. The wiring work was carried

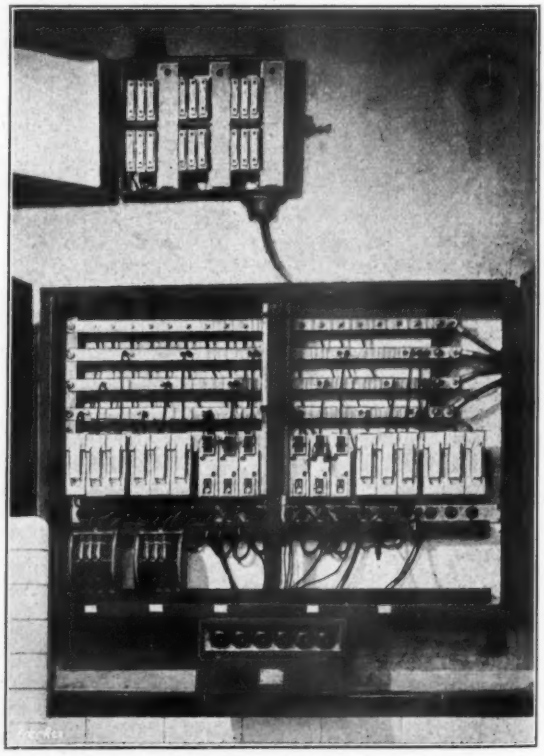


Fig. 6.—Control Board (Incomplete).

out by Messrs. Hopes Heating and Lighting, Ltd., who also supplied and fitted up the control board. The thermostat control equipment was supplied by Sadia, Ltd. It is of interest to note that the makers of the heating tubes have guaranteed to maintain free of cost their apparatus for five years.

Northcliffe House, London.

A descriptive account of the very extensive electrical equipment of one of the largest and most modern newspaper establishments in this country, which has a present printing capacity of 576,000 copies of a 20-page newspaper per hour.

THE production of nearly two million copies of a daily newspaper is a task the true magnitude of which can only be appreciated by a journalist. The printing of the normal 20- or 24-page issue of the *Daily Mail* means that the London and Manchester establishments require some 355 tons of paper nightly.

The feat has been made possible by the modern equipment installed at Northcliffe House, Carmelite Street, London (fig. 1), the new headquarters of Associated Newspapers, Ltd., which has 3,000 employés directly on its pay-rolls.*

Means of communication are an essential factor in newspaper work: the telephone installation includes 50 exchange lines and 260 instruments, six switchboard operators being on duty simultaneously, and no fewer than 6,000 incoming and outgoing calls are dealt with in 24 hours. An extensive telegraph installation is in constant use; photo-telegraphy is employed and wireless reception also, whilst the internal intercommunicating electric signalling bell and pneumatic tube installations save much valuable time. No less indispensable are the mechanical conveyance of materials and the push-button control, wherever possible, of plant, which is electrically driven entirely. Features of the installation are standardisation and duplication of equipment throughout, so as to guard against failure anywhere. The electric lighting and power distribution systems were designed and carried out by Rashleigh Phipps & Co., Ltd. Electricity is purchased from the City of London Electric Lighting Co., Ltd., and a stand-by supply is provided by the Charing Cross Electricity Supply Co., Ltd., which is utilised for a short period four times a year; thus the effectiveness of the stand-by services is checked, duplicate plant being operated in rotation, and the change-over can be effected completely in 4.5 minutes. The duplicate 1,000-kW services enter two main switch rooms in the basement at opposite corners of the premises, each feeding half the building: all the important power cables are paper-insulated, lead-covered, and armoured, invariably operating 3 in parallel instead of singly, to guard against complete failure and facilitate installation.

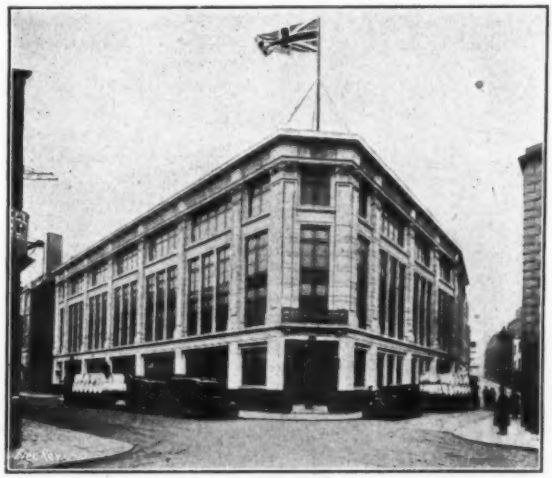


Fig. 1.—Northcliffe House, London.

The main switchboards (figs. 2, 3, and 4) are remarkable for the absence of circuit breakers. As is indicated in the foreground of fig. 2, the cables terminate in knife switches (500 A each in parallel) at the top and bottom of the board, with Peard fuses between: thus the division of each cable and switch into three permits of any fuse being attended to in safety by manipulation of the knife switches without interrupting the circuit. In the plaster-of-Paris housing of each fuse is a spring which ejects a tongue when the copper strip fuses, so breaking the arc. The fuses have functioned very satisfactorily and are cheaper than circuit breakers, the setting of which would have been such as to render their operation extremely infrequent.

The change-over switches were specially devised: from fig. 4 it will be seen that they are of the 3-blade, 3-way pattern, mounted on a bakelite-insulated steel bar. A switch can be withdrawn, pushed along the bar, and re-inserted quite easily in the requisite change-over links, stops rendering the operation fool-proof. It is claimed that each of these special switches saves two ordinary change-over switches.

The distribution system is d.c. 3-wire throughout, with "Oxford" ironclad switchgear made by W. Lucy and Co., Ltd., arranged in rows above and below a central bus-bar chamber (fig. 3); each switch is labelled and marked in colour, and in each switch room there are twelve 200 A and twelve 100 A at 420 V and eight negative and positive 100 A at 210 V. The wiring is all drawn into screwed steel conduit. All metal work, including the steel frame of the building, has been carefully earthed to bolted and welded copper strip, which is terminated in the water well in the basement.

The electric lighting is very complete: half the building is served from one switch room and half from the other, while a system of pilot lamps is fed from the Charing Cross Co.'s stand-by circuit. There are over 1,000 lighting points, and the illuminating glassware is British throughout. The larger work rooms are generally illuminated by means of "White Osram" lamps and Benjamin reflectors, local lamps being provided where necessary; care has been exercised to furnish adequate intensity and avoid glare. In the photographic process room arc lamps are employed for printing and enlarging.

Surveying the power plant, about 2,500 h.p., one is most impressed by the economical use of space effected in installation, and the high degree of standardisation accomplished in the general plant. Wherever possible motors (Crompton Parkinson, Ltd.) of identical design are utilised for driving entirely different types of machines; also practically all the control gear is of one make (Igranic Electric Co., Ltd.). Thus, moulding presses (4.5 h.p.), matrix mangles, autoshavers, and autoplate machines (fig. 9) (Linotype & Machinery, Ltd.) all perform widely different functions in preparing the type, and the fact that the nine motors employed for driving them are all of identical design and interchangeable (notwithstanding varying atmospheric temperatures) reflects creditably on their adaptability. Practically every mechanical function at Northcliffe House derives its power from an electric motor, and of some 80 Crompton machines noted in the installation the powers range from 1 or 2 h.p. to

* The *Daily Mail*, the *Evening News*, the *Sunday Dispatch*, and the *Overseas Daily Mail*; the *Continental Daily Mail* is published in Paris.

225 h.p. The cycle of operations of a matrix mangle, not unlike that of a planer, comprises a forward motion of the plate bearing the type that occupies about 30 seconds; then follows a return motion at the same speed, and a few seconds rest before the forward operation is repeated. In the case of the autoshavers,

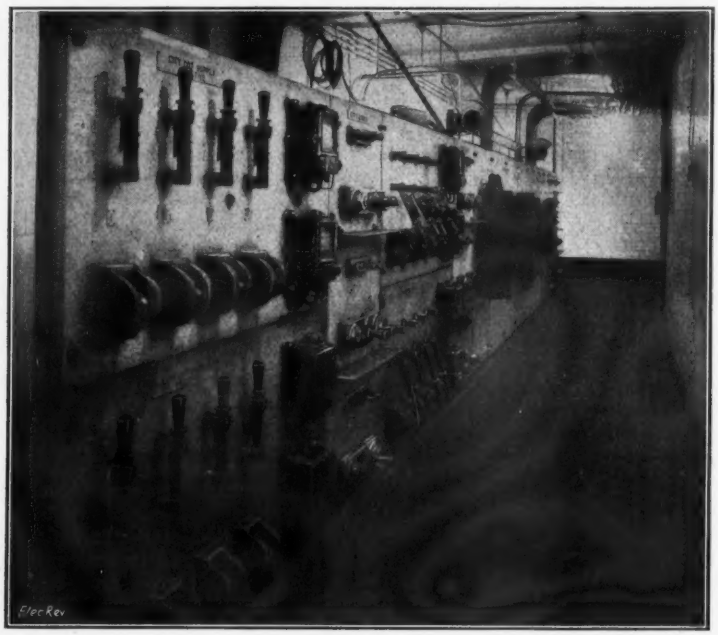


Fig. 2.—Fuse Panel of Main Switchboard.

the full-load output is required from the motor six times per minute, and the full-load period is about 6 seconds. The autoplate motors, coupled by chain, are called upon to supply full load for three seconds in every half minute, that being the period occupied in sawing the rough ends from the type cylinder. Identical Crompton motors supply the power to all the aforementioned machines. The specification of each is totally enclosed shunt-wound reversible d.c., with half-hour rated armatures and continuously-rated field; 5 b.h.p. is developed at 800 r.p.m. at 420 volts, and each is complete with two self-contained end shields carrying ring-lubricated bearings. Total enclosure has proved to be a valuable preventative of ingress of fluffy dirt, oil, and ink, whilst thermal insulation is well cared for throughout the plant: thus, one finds motors working within a few inches of a 7½-ton crucible of metal at a temperature of 600 deg. F. and in an atmosphere the temperature of which does not exceed 120 deg. F.

In the compositors' room trimmers, planers, &c., are push-button controlled. The moulding presses, supplied by W. J. Light & Co., have hand starters, and the autoplates are provided with hand starters and hand-operated combined starting and shunt-regulating rheostats. Electric hot-plate tables on which the matrix is backed are fitted with 750-W Igranic heaters. The 30 Linotype (setting) machines are electrically driven and provided with thermostatic control of the metal-melting pots, which are electrically heated as shown in fig. 6.

Operated by three panels arranged for master switch and float control, the foundry water-cooling system consists of two Worthington-Simpson 2-stage, 15-h.p. motor-driven turbine pumps which lift the water 100 ft. to a tower on the roof fitted with an 18-h.p. Heenan & Froude fan.

From the foundry the 56-lb. stereo-plates are conveyed to the printing presses on a roller Lamson conveyor (fig. 7), which is reversible and driven by seven motors located under the floor, and controlled by push buttons from various locations; ironclad reversible panels with shunt field regulators are used; one panel controls three and the other four motors. The stereo machines, fans, paper conveyors from the presses to the publishing department, &c., are driven through Renold chains, which also transmit 1,800 h.p. to the printing presses, whose motor resistances are visible under the gallery in fig. 8 (left).

Messrs. Witton-James, Ltd., supplied, installed, and put to work the complete electric power plant for operating the 48 rotary web press newspaper printing units, arranged in four lines (half each Hoe and Goss presses). It will be observed from fig. 8 that the 20 sets of variable-speed, 2-motor-type, 100-h.p. driving plant are located between the lines of presses and are normally covered by the chequer-plate flooring. Half the motors drive on one side and half on the other, the 8-page printing units being so coupled that any two units may be driven by any motor in their line; full automatic push-button control combined with various signal stations, centralised at the switchboards on galleries at either end of the press room (figs. 10 and 11) enables the machinery to be operated in practically universal combination. Push buttons enable the paper reels to be moved a fraction of an inch to right or left, to obtain even paper margins. Others permit the speed of printing to be accelerated or reduced, the presses being started by the 15-h.p. motors, and when a certain speed is attained the 100-h.p. motors assume the driving load. Safety "stop" buttons can be reached from numerous positions.

In the sub-basement on the floor beneath the presses 48 magazine paper-reel stands (fig. 15) exemplify an

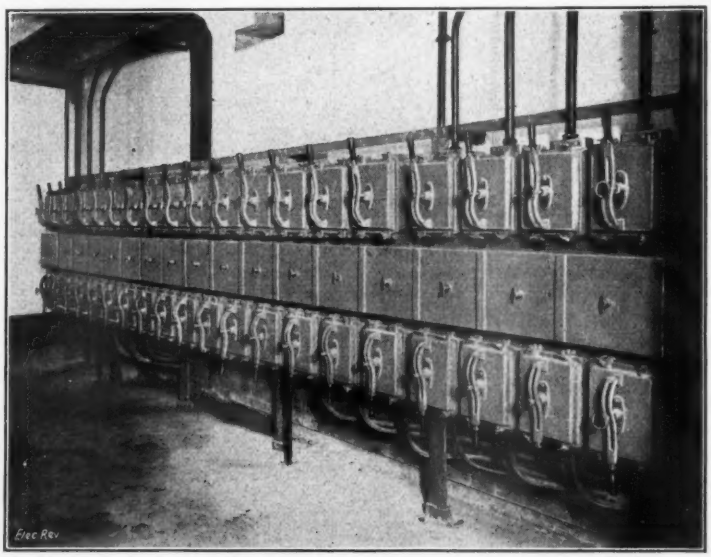


Fig. 3.—One of the Distribution Boards in Switch Room.

interesting application of the electric drive. A holder carrying three reels (five miles each) of paper feeds upwards to the press; as the end of the roll is approached, the speed is automatically reduced, the end of the roll is pasted and joined to the beginning of the new roll, and the old one slit, without inter-

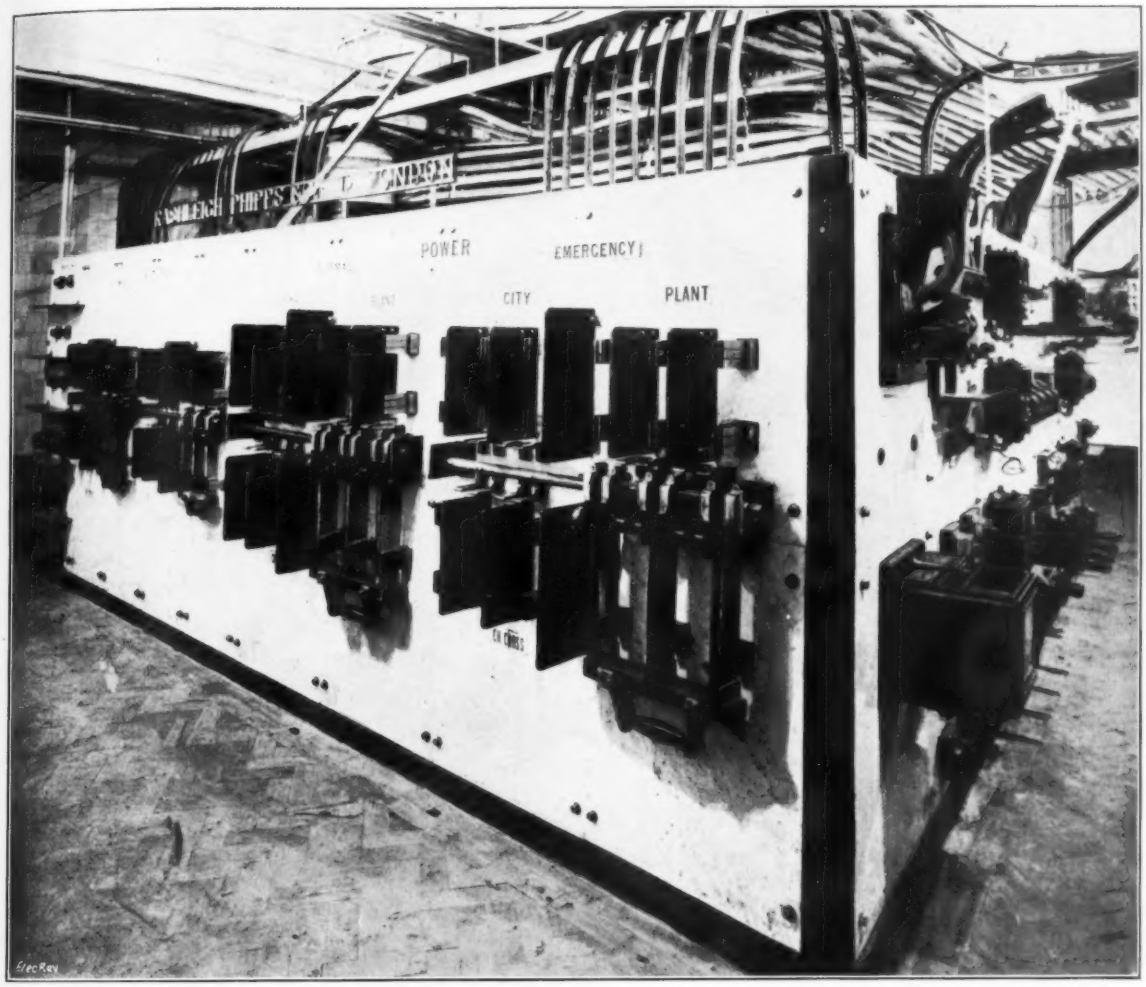


Fig. 4.—Change-over Switch Panel in One of the Two Main Switch Rooms.

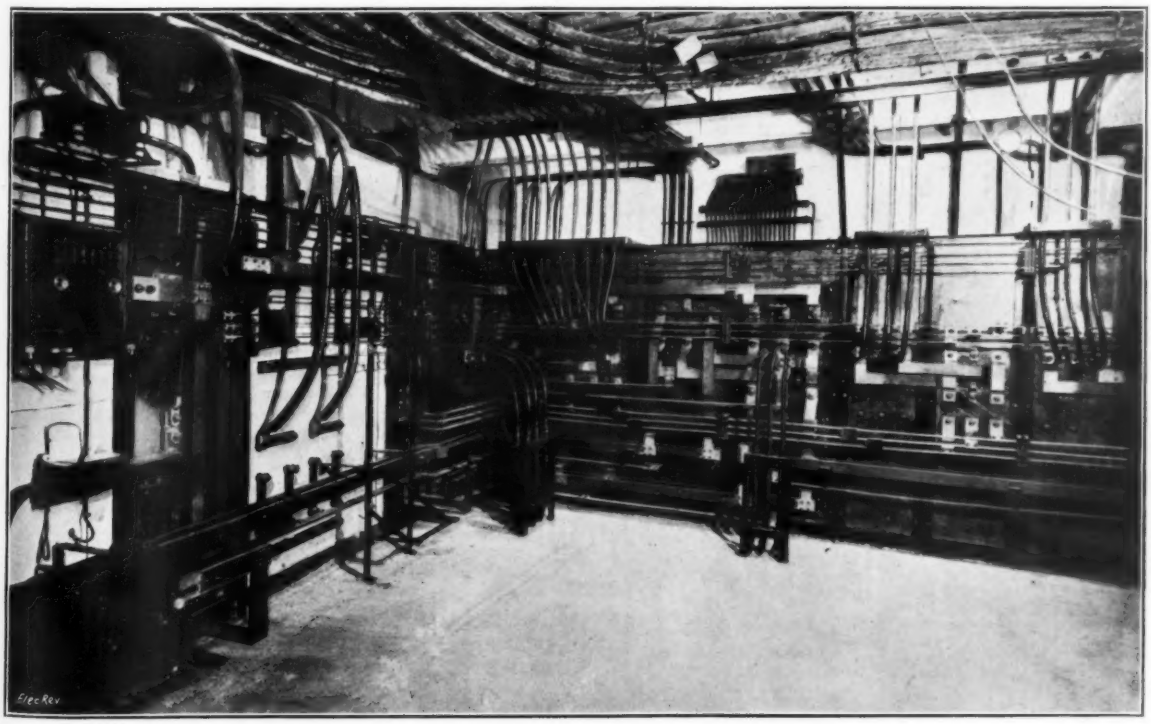


Fig. 5.—Back View of Boards in Main Switch Room.

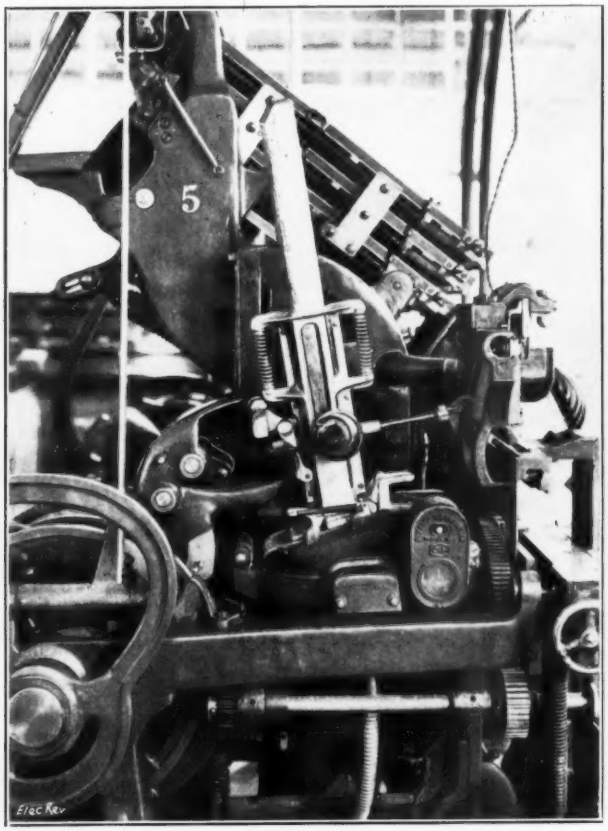


Fig. 6.—Part of Linotype Machine, showing Electrically-heated Metal Pot.

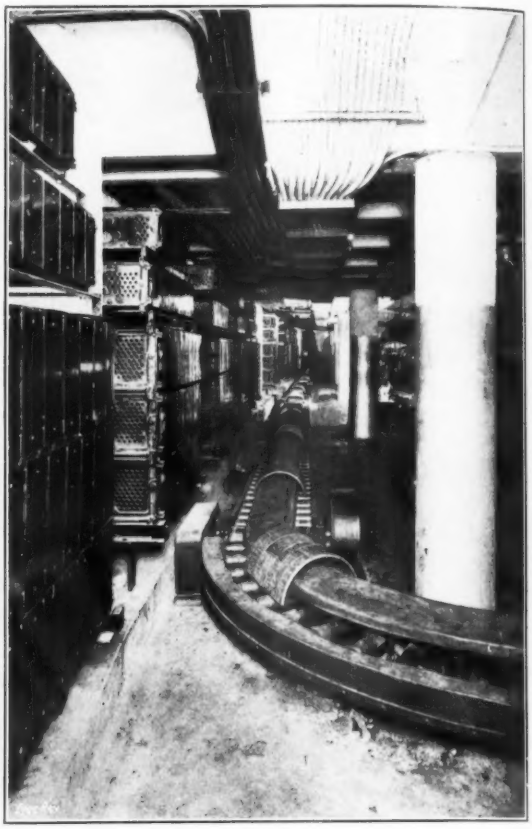


Fig. 7.—Electrically-driven Stereo-plate Conveyor; Press Motor Resistances on Left.

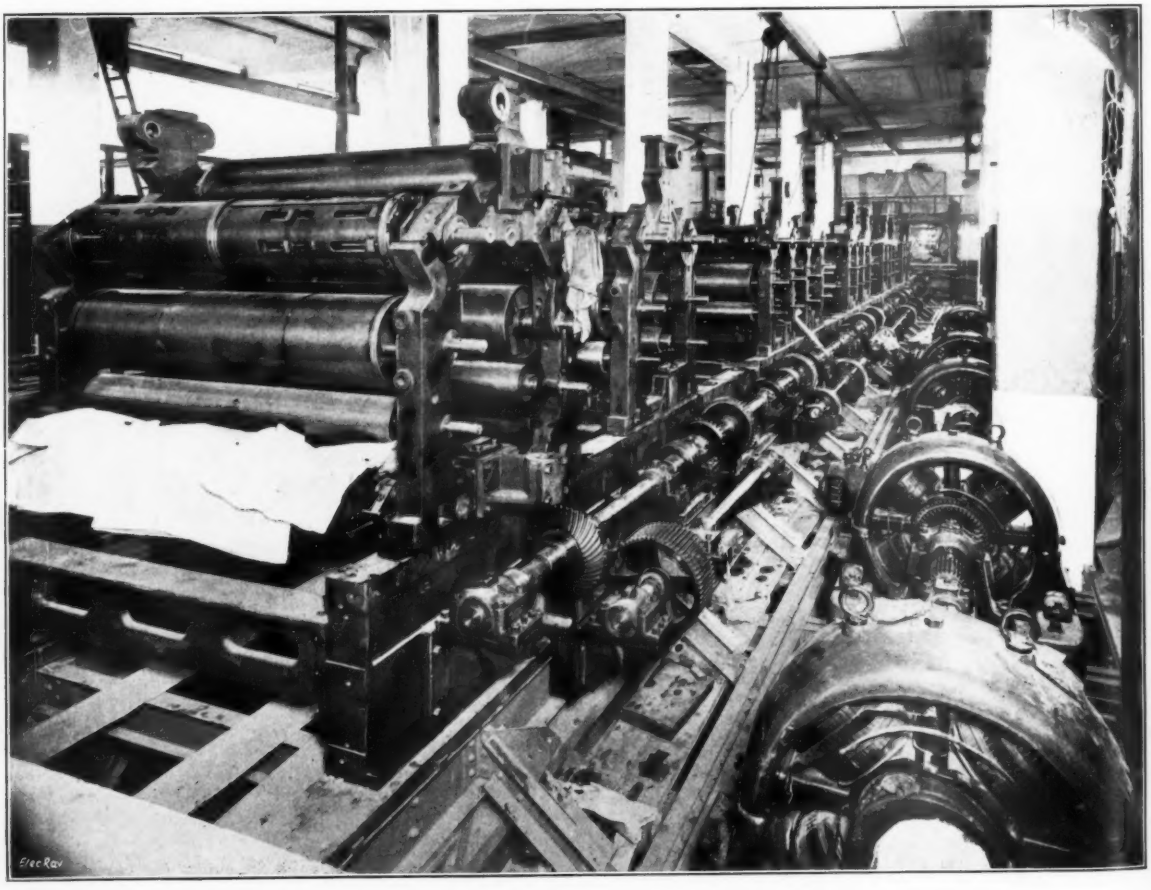


Fig. 8.—Printing Presses, Driving Motors, and Gear Shafts during Erection.

Fig. 9.—Foundry, showing One of the "Junior" Autoplate Machines.

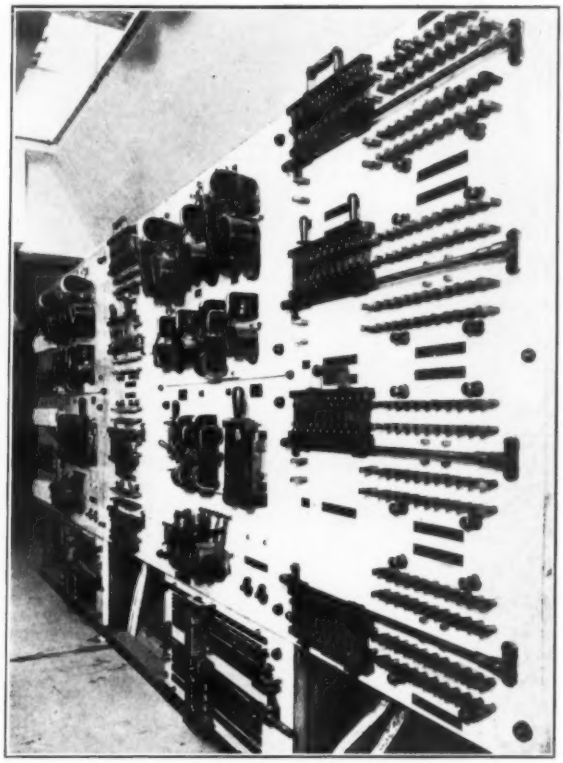


Fig. 10.—Part of One of the Printing Press Control Galleries.

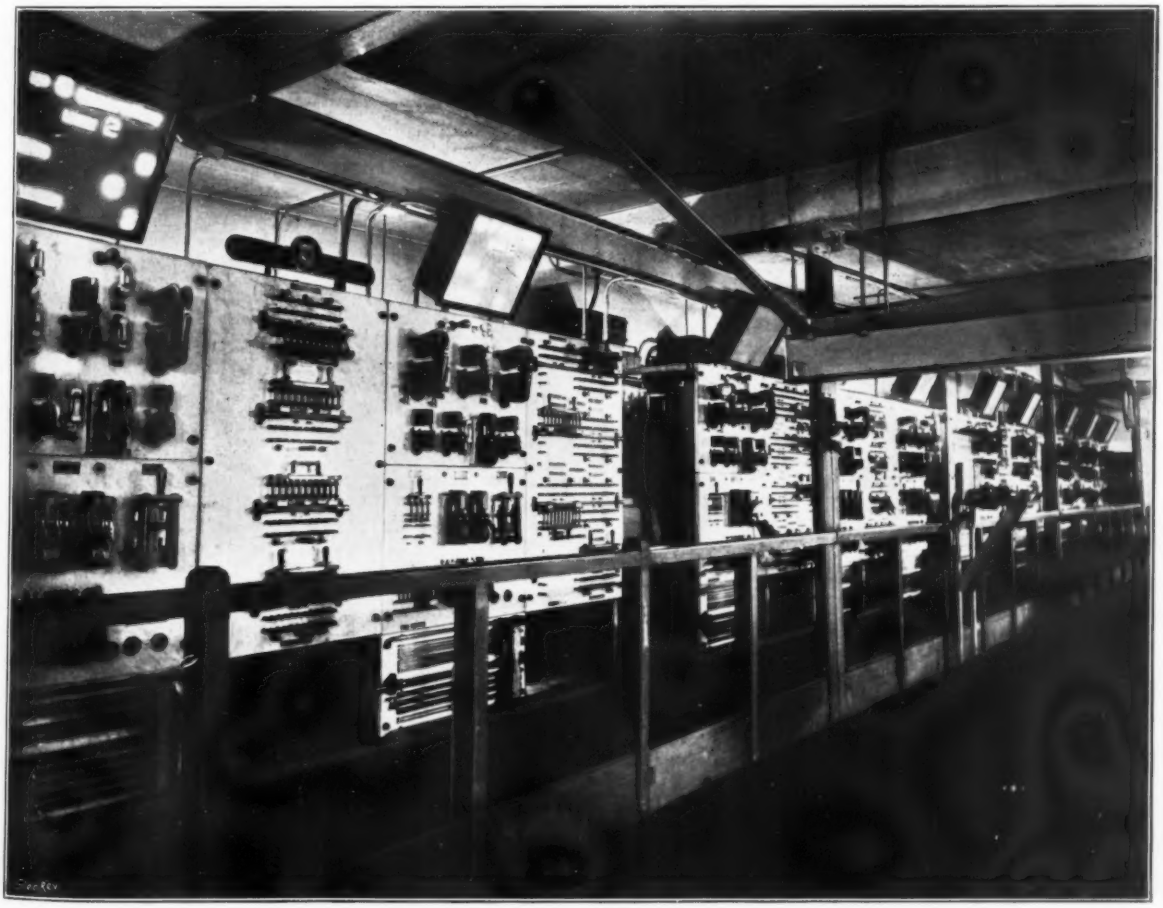


Fig. 11.—One of the Two Main Printing Press Control Board Galleries.

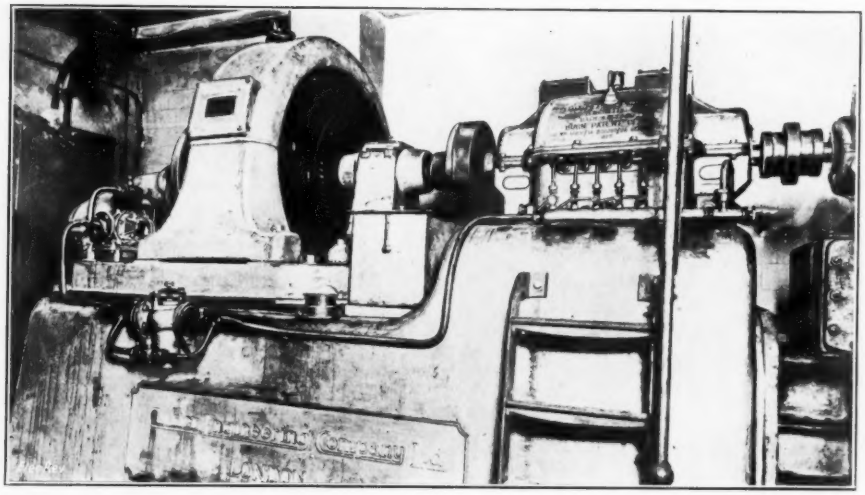


Fig. 12.—Air Conditioning Plant Motor, 250 h.p., and Gear Box.

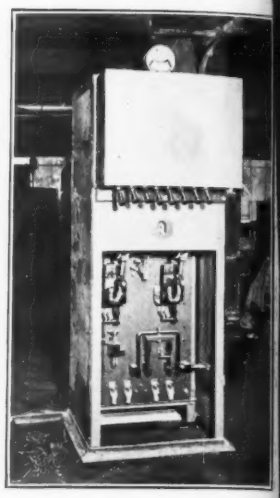


Fig. 13.—Igranic Control Gear for 250-h.p. Motor.

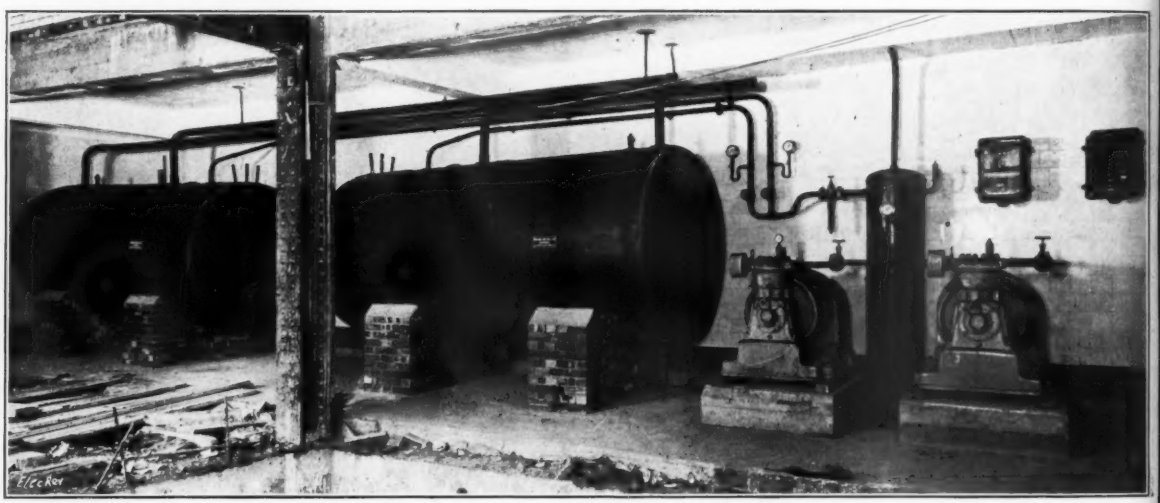


Fig. 14.—Ink Storage Tanks and Air Compressors.

Fig. 15.—Two Paper Reel Magazines for Feeding Printing Presses.

rupting the feed. Each reel is operated by two 2-h.p. Crompton motors, 96 in all. For stacking the paper reels in the emergency store a motor-operated Morris tiering machine is employed (fig. 16), which travels, elevates and lowers, collecting electricity from overhead conductors. Push-button-operated automatic reversible starters control the lifts that raise the paper reels from the street wagons to the stores, and the push-button Morris foundry lift is controlled by a reversing contactor panel. Six "Express" electric lifts serve the building, three passenger and three goods.

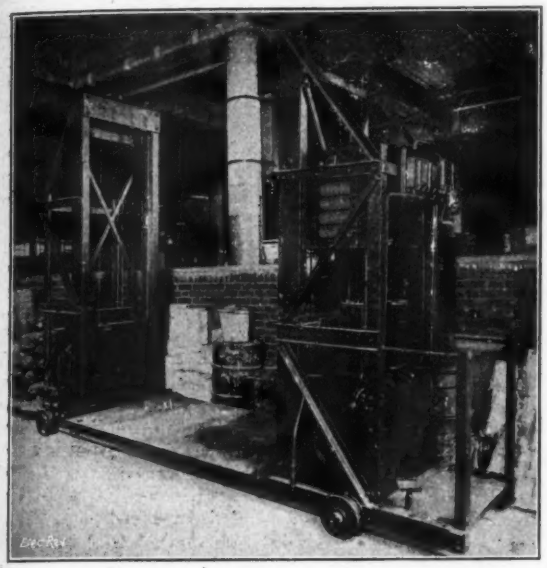


Fig. 16.—Paper Reel Tiering Machine.

Speed of distribution is the essence of modern newspaper service, and one link in the chain has been forged satisfactorily by the utilisation of Igranic wire conveyors for transporting the papers from 26 printing press folders to the publishing room. A space of 2 sq. ft. is ample for the base of a conveyor taking the entire run of one folder, and adaptability to contingencies of construction is another commendable feature: no two conveyors at Northcliffe House leave the press in quite the same direction, and no number of kinks, twists, turns, changes from vertical to horizontal, or *vice versa*, impairs the speed or efficiency with which they function. The conveyor consists of a braced and stiffened tubular steel frame, carrying sets of grooved wooden rollers over which run a number of parallel round belts of specially high-grade coiled spring-steel wire, these flexible belts carrying the newspapers. The conveyor itself is driven positively from the printing press, so that its speed synchronises with that of the press: no matter what may be the speed, it takes the papers to the delivery table as fast as printed, without intermediate handling. It is geared so that the papers are taken from the fly more rapidly than they accumulate, and this difference in speed gives the width of overlap of one paper upon another. This may be varied from 3 to 6 inches, as desired, without interfering with the press. The papers are gathered again in piles, automatically, at the delivery table. An automatic "kick" on the press puts every quired copy corner-wise, thus facilitating counting; the conveyor preserves this position. When the press stops at the end of the run, the conveyor is cleared by an auxiliary electric motor. When conveyed vertically, the papers are carried between two sets of wires, held by pressure rollers, but on horizontal stretches they lie free on top of the wire belting. Each of the 20 pairs of folders will fold 600 copies of a paper per minute. Igranic electric counters are fitted to the printing presses for recording the output of each individual press, and a totalisor operates in conjunction with the individual counters for recording the aggregate output.

Band conveyors in the publishing room are equipped with special control panels mounted on pillars, each including a drum-type, hand-operated reversing switch, automatic starter, shunt field regulator with speed-setting feature, and a "forward," "reverse," and "stop" push-button box.

Richard Crittall & Co., Ltd., carried out the anti-fire sprinkler system, ink-distribution plant, and the hot-water and warming installations. The whole of the piping has welded joints, which are not only a safeguard against leakage, but also much neater and less obtrusive than screwed joints. The ink distribution system consists of two 10-ton storage tanks (fig. 14), maintained at a suitable temperature to enable the ink to circulate through pipes to the presses where it is fed to the ink ducts at a pressure of 20 lb. per sq. in., maintained by Reavell air compressors driven by 7-h.p. 450-r.p.m. motors.

Booster pumps are provided for the domestic hot-water system and the small motor of a circulator, used only during cold weather, has to operate only about 15 minutes every hour. The warming system consists of radiating surfaces formed by embedding panels of hot-water pipes in the concrete ceilings on the whole of the ground and upper floors.

The ventilation of the printing press room demanded special attention. The relative humidity is kept fairly high, because it reduces the amount of static electricity generated on the paper as it passes through the rolls: if the air is dry the paper is rapidly charged with electricity, and any dust and fluff in the neighbourhood is rejected from it into the atmosphere, to the detriment of the health of the workers in a dry atmosphere. It was found that 70 deg. F. and 70 per cent. relative humidity were the conditions desired in this particular portion of the building, which houses some of the most powerful presses yet built, the equivalent to 80,000 British thermal units per minute being dissipated in the room. Evidently this heat has to be removed by exhausting the air and at the same time supplying cool air in large volumes. For maintaining equable conditions throughout the year, Carrier air-conditioning plant was installed, including a large fan capable of handling up to 10 tons of air per minute, a conditioning machine for regu-

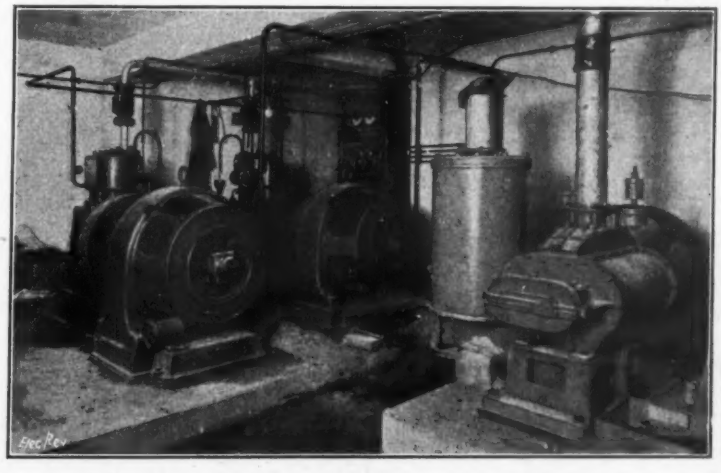


Fig. 17.—Water Plant (left) and Pneumatic Tube Blower.

lating the quantity of water-vapour in the air, a steam heater for adjusting the temperature, oil filters to remove dust and soot, a complete system of specially-designed distributing ducts, oil-fired boiler, and a refrigerating machine capable of exerting a cooling effect equivalent to over 200 ice melting tons. The whole is co-ordinated to act as one machine under the control of automatic regulators. In winter the outside air is pre-heated before passing through the water sprays, and the controls which regulate the supply of air and the amount of steam passing into the heaters are situated actually in the press room. They at once detect the slightest variation in temperature, or humidity, and communicate the change through a pneumatic relay to the point of control, so that the plant is readjusted to stop variations of 1 to 2 degrees. In the summer also the air is drawn in by the fan through the humidity regulator, but the water is cooled by means of the refrigerator. The electric motor, shunt regulated for from 800 to 1,200 r.p.m., driving the large fan (fig. 12) through Stothert & Pitt reduction gear, is required to attain to maximum speed at 225 h.p., falling off in load much quicker than in speed, to 50 h.p. The periodicity of surge is 15 seconds, and the possibility of the inertia of the compressor causing the motor to operate as a generator has not caused any difficulty. An Igranic enclosed heavy-duty multiple-lever hand-operated starter is employed with two interlocked single-pole main contactor switches (fig. 13). There are also one or two pillar-type "Conspede" control panels mounted in split housings, and other Crompton motors used are of 18 and 100 h.p. In the boiler house the forced-draught fan is interlocked with the oil fuel pump, and a safety switch located in the doorway enables all the motors to be stopped in case of emergency. A Sturtevant turbine vacuum cleaner driven by a 15-h.p., 3,000-r.p.m. motor has been installed, and sockets all over the building for plugging in suction cleaners. A Lampson pneumatic tube system (fig. 17, right) maintains communication between North cliffe and Carmelite Houses; the Newton motors are controlled by two special panels which embody Igranic automatic starters with a special timing device: when a carrier is placed in a tube that action presses a button which causes the motor to run for a predetermined time and then automatically to come to rest. Some 450 h.p. of motors is required to drive the air plant in the building alone. Le Grand, Sutcliffe & Gell, Ltd., carried out the water plant (fig. 17, left); 40-h.p. motor-driven compressors force air into a well, causing the water to rise into small tanks in the basement, whence it is elevated by two 22-h.p., 450-r.p.m. motor-driven pumps to a large tank on the roof, which serves the whole building by gravity flow. Float switch and Watford eddy-current control is employed. Owing to the depth of the basement, a motor-driven pump had to be provided to assist the flow of sewage.

Reference must also be made to the (Magneta Time Co., Ltd.) magnetic clock installation and to the staff canteen equipment, which includes 35 kW of electrical accessories. Messrs. Benham & Sons, Ltd., consider it undesirable to heat the boiling table electrically, although it is part of the principal equipment in the kitchen, *viz.*, a treble-oven range; therefore, the ovens are electrically heated, each of which measures 22 × 22 × 24 in., loaded to 16.5 kW in all, while the hot-plate top is gas heated. Other electrical fittings include a carving table with a bain marie at one end, 7 ft. 6 in. long, loaded to 17.5 kW; and an electric grill loaded to 4 kW, amongst other devices.

Peak Load Control.

A Scheme for the Control of Peak Load by means of Relays fed from the Street-lighting Circuit.

By H. WILSON, A.M.I.E.E.

THE art of modern electricity supply may be said to be the production of the maximum possible number of kWh from the minimum amount of plant, or, in other words, the cultivation of a high load factor; it is only by such means that any considerable reduction in the capital charges per kWh sold can be effected. It is well worth while, therefore, to investigate any uses of electricity which, while adding to the output, can be quite definitely stated not to increase the peak load.

From this point of view, quite an ideal arrangement would be to have two sets of distribution mains radiating from the generating station, with duplicate services to each customer, one set of mains being permanently alive, and one set switched off between the hours of 4 p.m. and 7 p.m. in the months of November, December, January and February. Consumers could then be offered a very cheap supply during off-peak hours, and an unrestricted supply at ordinary rates. With this arrangement doubtless a very great improvement in the station load factor would result.

Such an arrangement, however, would be impossible in practice, as distribution charges would be doubled, and it would be very cumbersome in working. It is claimed that almost identical results can, however, be obtained by a pilot-wire system, with only a very slight increase in the initial cost of distribution. I think most mains engineers will be very much in favour of a separate conductor for street lighting. It is well worth while from the street-lighting point of view alone, and when installed it can be used for several other purposes, one being to definitely cut off during the street-lighting hours certain supplies which the customer will willingly do without during that period if he is offered sufficient financial inducement to do so. In considering such loads, capital charges on the mains and generating plant can be left out of the reckoning, and it is therefore possible to offer a very considerable reduction in the cost per kWh, and still make quite a handsome profit for the undertaking. At this stage it may be as well to go into some details of the pilot or street-lighting system before enumerating in detail the uses, other than street lighting, to which it can be put. I do not like coming down from the general to the particular, but in most cases it is easier and of more use to describe an actual working system than an imaginary one, and I hope, therefore, readers will pardon me for putting before them the system actually in use in my own town, in the hope that they will be able to adapt it to meet their own requirements.

Each of the three-phase, four-wire distributors, in addition to the four main conductors, contains an extra 0.025 conductor for street lighting. The latter are brought out in the feeder pillars and kiosks to separate small fuses, so arranged as to form a miniature reproduction of the main distribution unit. In feeder or distribution pillars there is room for these units, either at the side or back of the main fuses; the small single-pole 15-A fuses are of the porcelain damper type which lend themselves very well to fixing in restricted spaces, and, of course, there is plenty of room in the kiosks and sub-stations. In each service cable from the main to the consumers' cut-out there

is included a single 3/.036 conductor, and I find that this can conveniently be brought out of the sealing trough on the consumers' cut-out, *via* one of the spare bushes, as most cut-outs provide a triple entry. This pilot terminates on the meter board in a small single-pole ironclad cut-out. The street-lighting and pilot system is single-pole throughout, all the returns being through the main neutral conductor. It is interesting to note that the additional cost of putting this single 3/.036 conductor in the service cables is £3 per 1,000 yards, or, assuming an average service of 30 feet, 7.2d. per service.

As regards operation, the switchboard attendant manipulates half an hour after sunset a single-pole 10-A switch, which energises the first street-lighting circuit, and in addition to lighting 10 or 12 lamps, also operates a 230-V solenoid at a central sub-station in the town, which closes a three-phase, 50-A switch. This switch, supplied by the Igranic Electric Co., Ltd., is of the type used in motor control, and as it only operates once in 24 hours it has a comparatively easy duty to perform. Five or six street-lighting circuits radiate from this central control switch, and these circuits are balanced on the three phases. These sub-circuits in their turn operate single-pole relays in remote kiosks and switch on the street lighting, at present confined to a radius of about two miles, although there is no reason why the system should not be indefinitely extended to cover a large area. In my own case I shall so control the street lighting of a town five miles off as soon as developments permit of the linking-up of the low-pressure mains. The main three-phase relays cost £7 10s., and the single-pole relays cost £3 10s. each. Doubtless a cheaper one could have been obtained, but it was considered advisable to use relays of robust construction and well over the capacity required. The single-pole relays which I am using at present, made by the Igranic Electric Co., Ltd., were designed for three-phase, 5-h.p. motors. I use the four contacts in parallel as a single-pole unit, and that gives a very safe job. Each relay has a hand-operated switch in parallel for emergency use if the actuating circuit fails, but up to the present I have only had to make use of one of these on one occasion. By means of the relay system, all the street-lighting conductors can be kept small. There is nothing bigger than 0.025 sq. in. I was afraid that the extra conductors in each service cable would complicate jointing, and possibly add to the labour costs, but in practice I think it only means that the cable jointer has a little less time in which to watch that interesting process of filling in the hole after the joint box is completed.

Most of my street-lighting circuits are switched on at dusk and off at 11 p.m.—a little drastic, perhaps, on late revellers, but as the city fathers all reckon to be tucked in by 11 p.m. in our town, only a few street-corner lights are left on after that hour, and these are controlled in the main streets by a second additional all-night conductor, and by time switches where only the 11 p.m. or half-night conductor is available. I shall have a word to say about this later, as if I had to do the job over again I should certainly dispense with the all-night conductor and the time switches in favour of relay control of all-night lamps by the half-night conductor, and thus make one additional conductor control both the half-night and the all-night lamps.

Now, as to the use of the system for other purposes than for street lighting: the first and obvious use is the control of water heaters. Unfortunately, one cannot store electricity on economic lines, but in a lagged tank, one can store heat in water, and this is a job which can be done quite well outside peak-load hours. Among my consumers I find a ready demand for 10-gallon water heaters to supply the kitchen sink and bathroom, and I have little doubt that these will stand cutting off from dusk to 11 p.m. without inconveniencing the consumer. I have one 15-gal. heater which has been so cut off for six months by a relay, and the customer is satisfied, and is still in ignorance of the fact that the current is cut off at certain periods. When I make the system general to water-heater consumers, I shall make a small reduction in the price from 1d. to ¾d. per unit, and I feel sure that will more than reconcile them to the new arrangement. All the water heaters are thermostatically controlled, and also by a hand-operated switch, and several interested consumers have assured me that they switch their water heaters off for 12 hours out of the 24 and still get sufficient hot water, from the 10-gal. size, for a consumption of from 30 to 40 units per week. In the bathroom in my own house an 11-gal. water heater, left entirely to the thermostat, used 43 units in the first nine days, during which time it had fairly liberal use. Reckoning 5 units per 24 hours and a loading of 700 watts, this means that it was in circuit for only just over seven hours out of the 24. By my relay system I mean to make certain that none of those seven hours are in the peak-load period.

As to the relays, the work required of them is very simple, and there is no reason why they should not be very positive in action. They have only, on the application of 230 volts to the primary, to open a 5-A circuit on the secondary and to keep it open while the primary current is on, closing it again at 11 p.m. when the street lighting goes off. The first sample ones made for me a year ago cost about £3 5s., but since the publication of my letter in the ELECTRICAL REVIEW some weeks ago (June 15th, 1928, p. 1071), I have had some much better offers, and also several very ingenious "home-made" samples. I have also had quotations from reliable English firms for lots of 25 at 25s. each. The best sample up to date is unfortunately foreign at 25s., beautifully made, and apparently a stock article, so that there seems to have been some considerable demand for them in other countries.

As far as I can ascertain at present, the relays will work on 6 watts, and as they will be in circuit for 1,400 hours per year the energy used will be under 9 kWh per annum per relay, which is nothing serious. Of late years there have been several successful attempts to regulate water heating in inverse proportion to the lighting current used in a house; while I regard these as steps in the right direction, they call for a more complicated relay switch, and sometimes for a two- or three-section element in the water heater. Moreover, if no lighting happens to be in use at peak-load times, then the water-heating circuit is full on. I think we should go further and make our slogan "No water heating at all during peak load." I suppose peak load occurs in most stations at between 4.30 and 5 p.m. on the Friday before Christmas, and I fancy that if one took the trouble to walk through any middle-class residential district at that time one would find many houses in comparative darkness—the man of the house at work, and the lady studying the shop displays. On the "inverse system" this would mean the water heaters full on; on my pilot system they would be all off. I firmly believe that at no very distant date most middle-class houses will be equipped with an electric water heater, and these, if suitably controlled, will provide the solution to the peak-load problem, and so lead to the cheap and abundant supply of electricity about which we have heard so much, that is, if the vast sums of money at present being expended have not already put it out of the question for many years.

The second use which I would suggest for the pilot-wire system is the control of power circuits. The 25s. relay previously described, if inserted in the no-voltage-circuit of a motor starter, will make certain that the motor will not be used after dusk. In my town many prospective power users, when offered a supply at 1½d. per unit if it is not used after 4 p.m. in November, December, January and February, or 2d. for unrestricted use, will choose the former tariff, and I have little doubt that the difference in price is justified by the certainty of not having the power demand on after 4 p.m. After all, it only means the consumer shutting down an hour earlier, and that

hour is often not of much use in trades where work is largely carried on out of doors, as, for instance, in timber yards, &c.

In the generating station often "up against it" for plant to meet its peak load, the switching on of the street lighting is usually the last straw, and, if it does not break the camel's back, it often leads to some anxious moments and possibly reduced voltage. When my pilot system is completed, the putting in of the street-lighting switch should lead to a welcome relief from load, as it will probably cut off considerably more than it puts on. I can even imagine the street-lighting switch being in considerable demand *during the day* at periods of breakdown or low steam, but perhaps this is an unworthy suggestion. Consider also the case at 11 p.m. when the running set is approaching an uneconomic load. The thermostats on the water heaters, after a period of enforced idleness, will all be in the "on" position, and cutting off the street lighting will put on sufficient to bring up the load to an economic value through the small hours of the night, when extra units mean only a trifling addition to the fuel bill.

There are other minor uses to which the pilot system can be put. With a street-lighting conductor in each house, the resident can be offered a 15-watt lamp in his porch or hall, or a 30-W lamp on his gate-post on an automatic or contract system without meter. Under our present tariff the 15 watts would cost 5s. 4d. per annum and the 30 watts 10s. 8d. per annum: not an excessive price to pay for the undoubted convenience of seeing the house number, avoiding the door-step, and locating the key-hole; also possibly an inducement to the householder to get home before 11 p.m. This, of course, does not assist peak load, but would give a long-hour lighting load at 3d. per unit.

Still another use is already in considerable demand in connection with late hour shop-window lighting. It consists of a double-pole change-over ironclad switch (price 9s. 6d.). One side is fed from the distribution board, and the other from the street-lighting pilot. The shopkeeper, on locking up, leaves on such window lights as he thinks fit, and changes the switch to the street-lighting position so that his window lights automatically go out at 11 p.m.—no complicated apparatus, no time switch to hire or set. For large premises leaving on several kilowatts, a contactor can be used, so that the actual current is not carried by the street-lighting mains. Our shopkeepers pay for 12 units per 30-watt lamp per annum at 8d. per unit, and all in excess at 1½d., so that by late-hour use only the 1½d. units are increased. Ten 100-watt lamps can therefore be left on for 1½d. per hour, and the shopkeeper is asked to compare this with the cost of Press advertising.

At this time many supply undertakings are extending their mains into new districts, and opening up new villages and towns. To the engineers concerned I would say consider the pilot system, its cheap first cost and many advantages. The same remarks, of course, apply to those who are relaying worn-out distributors; putting in the extra conductor in distributors and services will be well worth while in the future.

With regard to the control of half-night and all-night lamps with one conductor, mentioned earlier in my article, my all-night conductor was limited to the main street of the town, and I soon had applications for all-night lamps at points where I had only the half-night conductor.

Into such columns I took a three-core service cable, *i.e.*, one conductor from the neutral, one from the half night, and one from a permanently live phase. I had intended to make the half-night conductor operate a relay to switch on the light from the permanently live conductor at dusk, to leave it on at 11 p.m. when the half-night current went off, and to switch it off at dawn by a second application of the half-night current, *i.e.*, by switching the half-night lamps on again at dawn for a few seconds. One firm sent me a sample relay which accomplished this satisfactorily, but, after some weeks' consideration, declined to make up the relay in the small quantities which I then required. The matter by then had become urgent, and I had to order time switches which have to be wound and set every 14 days. I now have another firm looking into the matter, and have no doubt it will produce a satisfactory instrument, and even if it cost as much as a time switch, it would be well worth while, as it would save on labour charges and would be less complicated to maintain. All it amounts to is a remotely-controlled single-pole switch in which the first impulse puts the switch on—the second puts it off. I have no doubt that this will be forthcoming, as there should be a general demand for it. There must be a great many towns with half and all-night lighting where it would be a convenience to control the lamps with one pilot.

The Thames Bridges.

A plea for the reorganisation of the London suburban railways on a plan made possible by electric traction.

By RALPH H. CRIDGE.

FOR many years past, a more or less angry controversy has raged over the Thames bridges, in particular over the fate of Waterloo and Hungerford bridges. Probably every reader of the Electrical Review is acquainted with the facts—not only London readers, for not only Londoners are interested in the amenities of the Capital, in particular of a part so near to so many of the headquarters of industry To how many of them has it occurred, however, that the controversy has been carried on without the least reference to electrical engineers—and that electrical engineers as a corporate body (which they regrettably are not) have acquiesced in the neglect?

Nearly two years ago a Royal Commission on Cross River Traffic (usually called the Bridges Commission), made a report, acclaimed at the time with some justice as a model of speed, clarity and practicability. So far as one remembers, its only greeting in the electrical Press was a brief leader in the Electrical Review which pointed out that, admirable as it was, it might nearly all have been written in the days of steam traction. The developments which railway electrification render possible were almost entirely overlooked.

As so much has happened since the Bridges Commission's report was published, we will briefly recall its main recommendations so far as they most nearly concern the electrical industry:—

(*a*) The present Hungerford Bridge was to be replaced by a new bridge immediately to the east, with trains running into a new Charing Cross Station on the site of Villiers Street and Buckingham Street. A road bridge was to be superimposed on the railway

bridge, running over the station, crossing the Strand, and running to ground at the Cavell Memorial. On the south of the river, Waterloo Bridge Road was to be roofed in for several hundred feet to provide the southern approach to the road bridge. This was condoned on the analogy of a street in Glasgow which the Commissioners had presumably not visited. This double-deck bridge would necessitate the electrification of all trains running into Charing Cross station.

(*b*) A new north and south road crossing the river near Blackfriars was to utilise the site of one of the two railway bridges there. The other bridge, Holborn Viaduct Station, and St. Paul's Station were to be retained, while Ludgate Hill station was to be reluctantly sacrificed.

Since the report was published, a measure of agreement has been reached between the Ministry of Transport, the London County Council, and the Southern Railway. As a result of this, the double-decker bridge is to be abandoned, and Charing Cross Station is to be removed to the southern shore of the Thames, with a decent embankment in front of it. Nothing at all has been heard of the new road at Blackfriars, which may or may not come to life at a later date. In the meantime, while we may regret the lack of traffic facilities, we can still rejoice in the continued existence of Ludgate Hill Station.

So far, the electrical engineer's sole interest in the London traffic problem has been the retention of a tramway system which, whatever its benefits, is a source of perennial loss, which undoubtedly impedes traffic wherever tramcars set down or pick up passengers, and which, in the fortunately rare event of a breakdown, causes wholesale congestion. The railways (apart from tubes) are run exactly as though the days of steam haulage were not past.

There are certain elementary considerations in railway transport which will occur to every engineer—and they are all ignored and derided in the present lay-out of the Southern Railway. First, a terminal station is a waste of time, space and labour. Consider: Victoria Underground station can dispatch 80 trains an hour from two platforms. The Southern Railway Station at Victoria, with an elaborate system of points and signalling, never dispatches more than 40 trains an hour from 17 platforms. Moreover, a terminal station means that large crowds of passengers are shot forth at one point (very rarely where they want to be) to find some other means of transport, causing great and unnecessary congestion in the streets and tubes.

The Southern Railway, has, within sight of the Thames, terminal stations at Victoria, Charing Cross, Holborn Viaduct, Cannon Street, London Bridge and Waterloo.

Secondly, every overground railway has to cross roads at frequent intervals. In consequence, the rail level must be at least 16 feet above the surrounding terrain, and is generally rather more. The immediate outskirts of London are consequently a network of embankments, and one has only to go from London Bridge to New Cross to realise the influence they have upon their neighbourhood. The Ministry of Health charts show with dreadful clearness the appalling wastage of health and life that surrounds all these embankments. That is in part due to lack of fresh air, and in part to the steady degradation of the districts, which soon become slums. That indicates a constant loss of health, life and money. In the days of steam traction, embankments were a necessity, although a sane and large-minded concept of London traffic would have avoided the need for more than half of them. To-day, when an electric train is quite a cleanly thing, there is no need to elevate it above the noses of the residents—there is, even, no reason for it to be above ground at all.

If one stands on the roof of Whitehall Court, one can realise that the Thames, bending round through Blackfriars to the Tower, encloses a vast peninsula which is strictly in the heart of London. The new Lost Property Office—the location of which we curse every time we lose an umbrella—is actually nearer to the Mansion House than the old one at Scotland Yard. Why is all this land neglected? Go into the *terra incognita* of Lambeth, Southwark, and the Borough. Even if a providential fire razed every building to the ground, could anyone make a respectable business centre of a district interlaced with railways as that is?

Consider these allied problems of terminal stations and embankments, and what possibilities arise before us? Simply, that for suburban traffic at least, both are unnecessary. Without for the time being disturbing main-line traffic, if the suburban lines of the Southern Railway at a distance of some three miles from Victoria, Waterloo, and London Bridge, were to sink beneath the earth, we would at once dispose of three cross-river railway bridges—one at Charing Cross and two at Blackfriars. We would also dispose, as above-ground structures, of Charing Cross and Holborn Viaduct stations, as well as St. Paul's *and* Ludgate Hill stations. Victoria, Waterloo, Cannon Street (if its retention at all is necessary) and London Bridge stations as above-ground structures need only be half their present size, or less. Innumerable viaducts and embankments could be removed from South London, with a corresponding release of valuable land and an improvement of adjacent site values.

But there is more than that. Having brought the suburban services underground to Victoria and London Bridge, a further underground loop could connect them, joining up at the Bank with a reconstructed Waterloo and City railway, which would continue the South Western suburban lines. Much has been made of the plaint of the Southern passengers to Charing Cross, who object to being dumped on the south of the Thames. They need not be—they, and all the other passengers, could be brought, without a change, to the heart of the City and the West End. There would be no terminal stations in London, and the frequency of suburban services could be increased, until they were comparable with the tubes, with a reduced signalling staff, and with elimination of the risk of accident and delay in foggy weather.

These are the brief outlines of a scheme which none but the electrical industry can further. Electrical engineers have the opportunity, as they have had countless times before, of being the *avant couriers* of the millennium. Will they take it?

The question of main line traffic has been left out, but can one doubt that in course of time the northern and southern lines must be connected?—and how can they be, except by underground links? It may be of less urgency to save an hour or so in crossing London on a main-line journey, or to enable Manchester to spend its holidays in Brighton or (if the Channel Tunnel materialises) in Paris, without meeting the expense and temptations of a night in London—but that the present hiatus in our communications should continue is unthinkable. There is now the opportunity to make immediate improvement, and to pave the way for still greater.

There is, of course, the practical consideration of cost, and we must not be led away too far by the thought that the money spent would mostly flow into the pockets of engineers. Even to deal with the suburban lines needs some 60 miles of underground single track, involving an expenditure of many millions. It is, however, an expenditure that will immediately begin to pay for itself. Some bridges and stations have to be rebuilt in any case. The Southern Railway is already spending millions in scrapping its overhead single-phase equipment, and putting down the third rail system for the sake of standardisation, and a very small economy in running costs; and there is a broader view as well. Thirty years ago, Holywell Street and its neighbourhood were a byword and a source of expense. To-day Kingsway and Aldwych are a source of pardonable pride and of perennial profit. If Lambeth, Southwark and the Borough can be added to habitable London, they also can share in the pride and the profit. The cost is great, but when the reward is greater, are we incapable of the conception and the labour?

A Diesel-electric Ferry Boat.

A vessel built for the Argentine Government by Messrs Yarrow, Ltd., with electrical equipment by the Metropolitan-Vickers Electrical Co., Ltd.

THE latest addition to the steadily increasing number of electrically-propelled vessels is a shallow-draught ferry boat built by Messrs. Yarrow, Ltd., to the order of the Argentine Government for service on the River Parana. The whole of the electrical propulsion equipment, together with all the auxiliary electrical machinery and fittings, has been manufactured and supplied by the Metropolitan-Vickers Electrical Co., Ltd.

Though comparatively small, the vessel is of exceptional engineering interest, being the first of its type to be built in Great Britain and giving an excellent opportunity of demonstrating the flexibility of the electric drive. The ease with which it can be manœuvred far surpasses that attainable with any other means, and results in a notable increase in speed in difficult and crowded waterways.

Fig. 1.—The Diesel-Electric Ferry Boat M.O.P. 5 B.A.

The vessel, fig. 1, which is designated M.O.P. (Ministry of Public Works), 5 B.A., is 145 ft. in length and 40 ft. in width of deck. With full load its draught is 4 ft. 5 in. and its displacement 340 tons. It has two decks; the main deck is designed to carry twenty motor cars, the clearance height between decks being about 12 ft.; the upper or bridge deck, on which are located two control houses, has accommodation for 150 passengers. The vessel is double-ended, and has a speed of 17 kilometres per hour in either direction with full load. The service for which it is intended involves trips of about 95 miles. That it is capable, however, of very much longer voyages, even under severe conditions, is indicated by the fact that it is shortly to undertake, under its own power and alone, the journey from the Clyde to Buenos Ayres, a distance of over six thousand miles.

The propulsion is by twin screws at each end of the vessel, each of the four screws being direct-driven by a separate d.c. motor rated at 200 h.p., 250 volts, 350 r.p.m., fig. 3. The two motors of each pair can be controlled jointly or independently, but only one pair of motors can be used at a time. Power is obtained from two main generating sets, each consisting of a six-cylinder, 350-r.p.m., M.A.N. Diesel engine directly-coupled to a 170-kW d.c. propulsion generator and to a 35-kW d.c. auxiliary generator, fig. 2. The latter supplies power for the auxiliary services on the vessel, and also provides the excitation of the propulsion motors and generators.

In view of the fact that the vessel is to operate in a semi-tropical climate, special ventilating arrangements for the propulsion machinery were considered necessary. Each machine is provided with a fresh-air supply through trunking from a suitable space between decks, and the heated air is exhausted up the funnel in order to avoid passing this additional amount of heat into the engine room.

A feature of special interest is the control scheme, which provides manœuvring control from each of three alternative stations—one in each of two pilot houses, situated at opposite ends of the bridge deck, and one in the engine room. Each pilot-house controller controls one pair of motors driving the propellers at the opposite end of the vessel, and only one of the controllers can be used at a time. In the engine room there is only one controller, which is arranged to control whichever pair of motors is selected for operation by the deck control gear. From each of the control stations complete control of speed and manœuvring operations can be carried out, with either one or two engines in commission.

The port and starboard propellers are separately controlled by means of two hand levers, one on either side of the controller head. A special delay device is incorporated in the controllers, making it impossible for excessive overloads to be thrown on the propelling machinery due to over-acceleration.

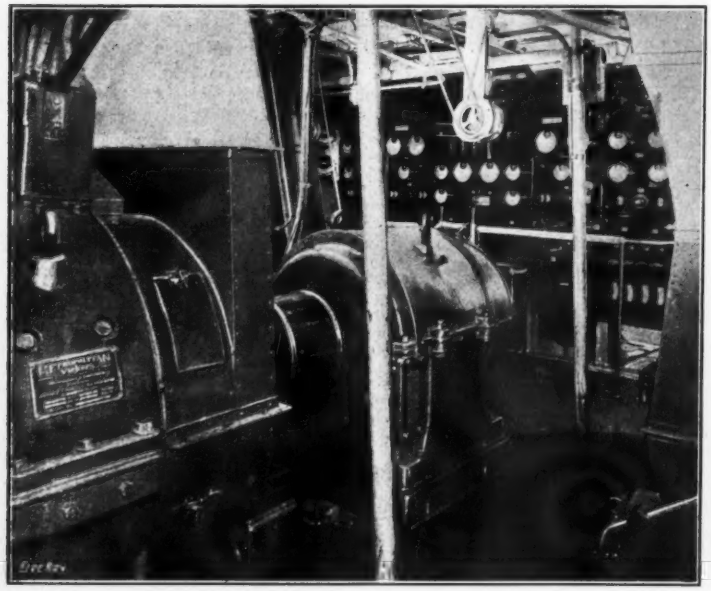


Fig. 2.—Part of the Engine Room, showing One Main and Auxiliary Generator and part of the Main Switchboard.

Fig. 3.—One of the Propulsion Motors, with Chain-driven Electric Revolution Indicator.

No instruments other than revolution indicators are therefore required at the pilot-house control station, fig. 4, in fact, a noteworthy feature of the installation is the manner in which all operations involving special knowledge of the plant have been eliminated from the navigating controls. At the same time, the propeller motors cannot be started without the co-operation of the navigating officer, and he alone can decide from which end the vessel shall be driven. In this way all question of divided responsibility is definitely avoided. This

which is set to trip well above service overloads and is specially designed to be proof against unintentional operation due to vibration or other such cause. There is thus no danger of loss of manœuvring power at critical moments. The electrically-driven auxiliary machinery forms quite an important part of the equipment, and includes fuel and fresh-water pumps, salvage pump, fire and bilge pump, winch-windlasses and fans, fig. 6. There is also an emergency paraffin-engine-driven auxiliary generator, complete with its own

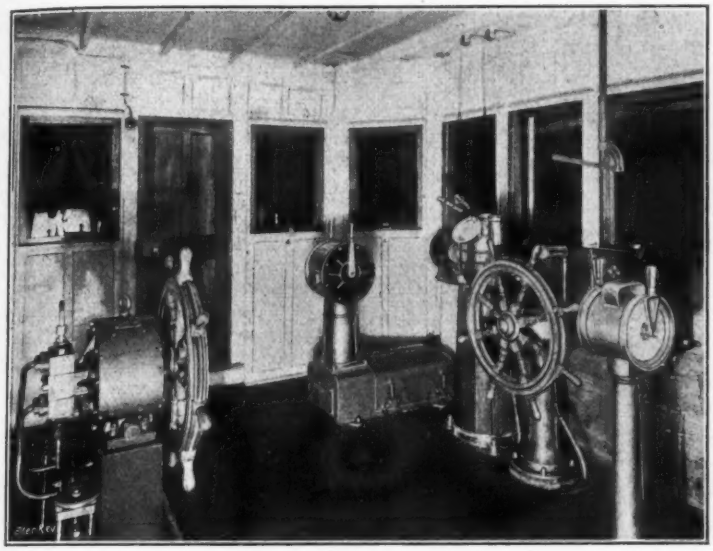


Fig. 4.—Pilot House; Electric Controller in background.

Fig. 5.—Multipoint Change-over Switch on the Bridge Deck.

very essential feature is attained through the medium of a multi-point change-over switch, fig. 5, situated amidships on the bridge deck. All control circuits are taken through this switch, which is operated by means of a removable key. In the "off" position of the change-over switch all controls are dead. When the switch is moved to either side, the corresponding control circuits only are connected up and the corresponding propeller motors are switched into circuit. The same key is used to free the pilot-house controllers, which are locked in the "off" position unless the key is inserted, and the key, once inserted to free the controller, is locked there until the controller is at the "off" position. The key, therefore, together with the change-over switch and the locks, makes all interference with controls impossible. At the same time, it is possible for the engineer in the engine room to signal to the pilot houses and take control instantly, if required. But here, again, a safeguard is provided, in that the position of the change-over switch on deck determines automatically which pair of propeller motors will respond to the engine-room controller.

It might be inferred from this description that a complicated process is involved in these operations. This, however, is not the case. The navigating officer, proceeding to one or other pilot house, simply operates the change-over switch in passing, and then inserts the key in the controller he is about to use.

The supervision of the actual performance of the machinery, of course, is in the engineer's hands only, the necessary switches and instruments being mounted on the main switchboard in the engine room. From this point, also, fine adjustment of propeller speed is obtained, enabling the power of each pair of propellers to be accurately balanced. If desired, the torque ratio between propellers and engines can be adjusted to enable the full output of the engines to be delivered under varying conditions of weather, tide, and hull resistance, an important feature which is peculiar to vessels with direct-current electric drive.

If one generator only is in commission, the speed of the motors is automatically limited to such a value that the single generator cannot be overloaded. The main circuits carrying heavy currents are not interrupted or altered during control operations, all speed regulation and reversing being carried out on the field circuits only.

Since prolonged overloads cannot occur (the motors having the same rating as the engines), the only protection required for the electrical circuits is that against actual faults. A special type of "inert" overload breaker has been introduced, switchboard, for maintaining a supply to essential services when the main sets are shut down.

We are informed that the vessel has undergone a series of exhaustive trials, which have been completely successful, demonstrating not only that the contract obligations have been met with a satisfactory margin, but also that the electrical installation is foolproof to an exceptionally high degree. This was particularly emphasised by a series of emergency control operations which were successfully carried out by an operator with no previous experience of the handling of the equipment. The propellers were reversed from full speed ahead to full speed astern in the remarkably short time of three seconds.

The successful results obtained are attributable in large measure to the close co-operation which has been maintained between the builders of the vessel and the suppliers of the equipment throughout the whole course of the work.

The construction and tests of the vessel have been supervised by Mr. Solari, representing the Argentine Government.

The flexibility of the electric drive, together with the advantages of the Diesel engine as a prime mover, renders this system of propulsion peculiarly suitable for ferry boats and tugs.

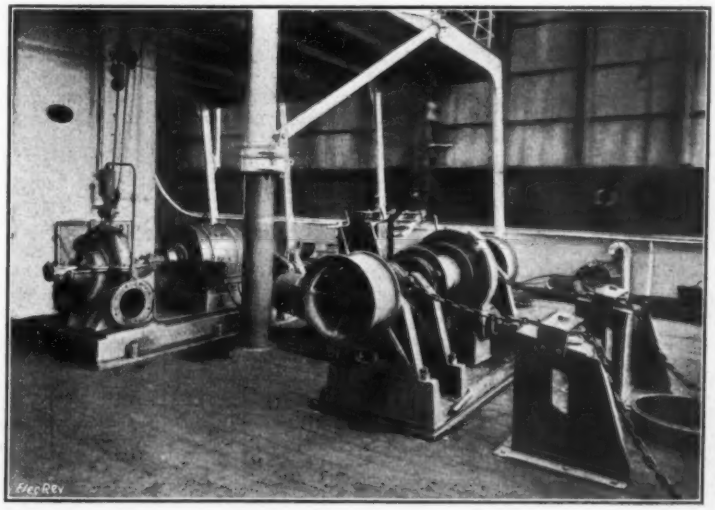


Fig. 6.—Winch Windlass and Salvage Pump.

Business and Industrial Notes.

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments. Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations and Failures.

Central Electricity Board Contracts.

We briefly reported in our last issue that switchgear contracts in connection with the above scheme had been placed with Messrs. A. Reyrolle & Co., Ltd., and the English Electric Co., Ltd. Messrs. Reyrolle now inform us that their contract includes switchgear for thirteen outdoor 132,000-V sub-stations connecting the national "grid" to London on the north side. These sub-stations are situated at Peterborough, Little Barford, Bedford, Luton, Barking, Brimsdown, Watford, Willesden, Uxbridge, Reading, Rayleigh, Colchester and Ipswich. The order is of a total value of about £330,000, and is claimed to be the largest switchgear order ever placed with a British firm. It will take over three years to complete, and, while it will give a considerable amount of additional work to Tyneside, it will be some months before details are sufficiently advanced to put any of it into the shops. It is unlikely that the order will necessitate any material addition to the number of people employed, which is already 3,000. All the equipment included in the large order and the 132,000-V overhead lines, which will stretch across the counties of Cambridgeshire, Huntingdonshire, Oxfordshire, Herefordshire, Essex, Middlesex, and parts of Bucks, Suffolk and Bedfordshire, will be protected by apparatus manufactured by Messrs. Reyrolle and specially designed by them for this important duty.

The following is a list of the contracts placed by the Central Board up to and including those mentioned above. It will be observed that in less than a year work of a total value of about £2,700,000 has been given out.

	Approx. value. £	Awarded to.
Central Scotland Scheme.		
Transmission lines	400,000	British Insulated Cables, Ltd.
Transformers ...	130,000	Ferranti, Ltd.
,, ...	120,000	Metropolitan-Vickers Electrical Co., Ltd.
,, ...	60,000	English Electric Co., Ltd.
River crossings ...	33,000	Foundation Co., Ltd.
Switchgear ...	182,000	Metropolitan-Vickers Electrical Co., Ltd.
,, ...	134,000	British Thomson-Houston Co., Ltd.
,, ...	18,000	A. Reyrolle & Co., Ltd.
Sub-station foundations	17,000	Various contractors.
South-East England Scheme.		
Transmission lines	500,000	Callender's Cable & Construction Co., Ltd
,, ...	500,000	General Electric Co., Ltd.
Switchgear ...	320,000	A. Reyrolle & Co., Ltd.
,, ...	270,000	English Electric Co., Ltd.

Since we compiled the above table we have learnt that the Board has placed a contract for e.h.p. paper-insulated, lead-covered and armoured cables with Messrs. W. T. Glover and Co., Ltd., for the Bedford district (South-East England Scheme).

In the House of Lords on November 8th, during a debate on unemployment, Mr. Churchill said that one form of help to general industry was the new measure for the improvement and extension of electricity supply. Four schemes had been adopted by the Central Electricity Board, and the total capital involved in those schemes amounted to £17,000,000 and contracts had actually been entered into for £2,750,000.

The Factory Lighting Campaign.

The latest report received from the British Electrical Development Association regarding the progress of the Factory and Workshop Lighting Campaign states that 111 lecture-demonstrations to industrial electricity consumers in all parts of the country have been, or are being, organised. The Manchester Circle is arranging a lecture demonstration at the new Metropolitan-Vickers switchgear works on November 22nd, and 6,000 invitations are being sent out. Meetings are being held at the works of the Revo Electric Co., Ltd., on November 21st and 22nd. It is reported that the attendances have been very satisfactory.

The 100,000 owners and managers of factories and workshops on the E.D.A. list have now received a copy of the standard specification for industrial lighting. This, in addition to stating the recommended intensities for many classes of work, gives diagrams of typical installations for various kinds of workshop. It also has a few notes on light measurement.

The Marking of Imported Rubber Products.

An inquiry as to whether products of rubber and rubber compounds should bear an indication of origin upon importation was commenced by the Standing Committee (General Merchandise) under the Merchandise Marks Act, 1926, on November 5th. The applicants for a Marking Order were the India-Rubber Manufacturers' Association, Ltd., and the opponents were substantial importers. During the inquiry it was announced that the parties had come to an agreement so far as ebonite was concerned. This provided that ebonite panels, sheets under four feet square, and sheets under three-sixteenths of an inch thick, should be unmarked, and sheets over that measurement should be marked on one side in one corner. The non-marking also applied to telephone ear-pieces, &c. With regard to accumulator boxes and all other panel articles except those already stated, it was agreed that where the article was exposed for sale in a box or container, then the container should be marked. Mr. Macaskie, for the opponents, mentioned that the agreement related only to a Sales Order. The inquiry was continued this week.

The Anglo-Hungarian Electricity Scheme.

Replying last week in the Chamber to Social-Democratic deputies who criticised the so-called "Talbot" central power house enterprise, Mr. Hermann, the Hungarian Minister of Commerce, said the establishment of the power station brought the electrification of the Budapest-Vienna railway line into the stage of realisation and this was of world significance. The loan for the establishment of the power station was, he continued, granted on condition that work was given to British industry. The chance of a favourable loan could not be missed. British and Hungarian industry participated in accordance with a fixed quota and only such orders were placed in Great Britain as must in any case be placed abroad. Negotiations were now proceeding on the question of whether the plant in whole or part in accordance with the fixed quota should be obtained from Great Britain. Hungarian industry had not suffered in any way.—*Reuter* (Budapest).

European Cable Makers' Conferences.

Concerning the reported movement among European cable makers, to which reference was made in a previous issue, it is stated that the first meeting took place in Switzerland in September, when representatives of h.p. cable manufacturing firms were present from Germany, France, Belgium and Czecho-Slovakia. The object of this conference was stated to be an amelioration of competition between the producing countries and the division of the exports to countries possessing no cable-making industry. A further conference took place in Paris on November 6th, when England, it is said, was also represented. In this case the object was reported to be the discussion of means for limiting and standardising the types of h.p. armoured cables for the purpose of reducing the costs of production. An understanding was not reached, but a further conference is expected to be held in the course of a few months.

A Large Uruguayan Contract.

The American Commercial Attaché at Montevideo reports that plans and specifications for a new power station in Montevideo to supply the increasing demand of the nation's capital for electrical energy have been completed. Specifications are now ready for distribution to American, British, German, French, and Italian engineering and contracting companies who will be invited, by the Usinas Electricas del Estado, Montevideo, to submit tenders covering the construction and equipping of the plant, the cost of which is estimated at more than 3,000,000 pesos (approximately £600,000).

New Russian Manufacturing Works.

The formal opening of the new manufacturing works of the State Electrical Trust in Moscow took place on November 4th, the site being that formerly occupied by the Provodnik works. It is stated that the works, which has been in partial operation for a little time, will be the largest in Russia and at the end of five years will be able to turn out products of the value of 96,000,000 roubles annually. The manufactures consist of projectors, h.p. transformers, &c., and it is intended to centralise there the production of lamps, small motors, Bergmann tubing, and wolfram wire.

Copper Production in Spain.

In a recent *Commerce Reports* article upon this subject it is stated that until very recently electrolytic copper was not produced in Spain, which necessitated the importation of considerable quantities of copper tubes, wire, cable, and other products. In 1920 the manufacture of such materials was commenced in the factories of the Sociedad Española de Construcciones Electro-Mecanicas in Cordoba, and in the succeeding years this company has increased its output and improved its methods until, in its present combination with the Asturian Industrial Co., it is able to supply the country's demand. This development has been brought about by a high protective tariff, shortly to be increased, according to report. In view of the extent of the Spanish copper deposits, it is expected that the Spanish industry will soon be able not only to supply the domestic market, but to export to other countries. The production of electrolytic copper by the associated companies rose from 3,060,000 kg. in 1923 to 5,650,567 kg. in 1926, and the 1927 output is estimated at 11,700,000 kg.

Italian Foreign Electrical Trade.

The appended table shows the Italian imports and exports of electrical machinery and apparatus during the eight months ended with August last, as compared with the corresponding period of 1927. The values have been converted to sterling at an exchange rate of 92.75 lire to the £. It will be seen that both imports and exports show an increase—the former of £354,530 and the latter of £41,505.

	Imports. Jan. to Aug.,		*Exports.* Jan. to Aug.,	
	1928.	1927.	1928.	1927.
	£	£	£	£
Accumulators and parts	21,885	9,870	27,058	29,450
Incandescent lamp bulbs	22,430	16,575	—	25
Electrical measuring instruments	23,275	19,675	545	735
Electrical apparatus, miscellaneous	529,605	299,500	73,400	69,615
Teleg., teleph., and radio apparatus	586,150	515,680	17,525	32,065
Electric furnace carbons	80,990	116,320	3,445	12,245
Insulated cables	27,000	22,280	83,765	79,375
Generators, "without collectors"	140,160	158,515	9,985	8,200
Generators, "with collectors"	160,495	145,675	150,170	112,715
Glass and porcelain insulators	19,425	30,690	10,420	2,500
Arc lamps	435	1,245	—	—
Incandescent lamps ...	279,750	208,580	41,875	18,075
Static transformers ...	40,125	45,735	6,165	12,860
Insulating tubes	24,700	315	2,475	1,005
Electricity meters	89,015	114,160	1,480	7,535
Insulated wire	31,575	20,255	36,090	36,230
Totals	£2,099,740	1,745,210	464,765	423,260

Proposed Co-ordination of London Traffic.

The London County Council, last week, after a session lasting for over fifteen hours, adopted a recommendation by the Special Traffic Committee that legislation should be promoted in the current session of Parliament authorising the Council to enter into an agreement with the Underground Companies leading to the unified management of the L.C.C. Tramways and other London transport services. The length of the session was due to the number of motions and amendments on the agenda, each of which occupied a considerable time. Sir Oscar Warburg, the chairman of the Committee, announced after the meeting that Parliamentary notices would shortly be published, and the draft Bill would come before the Council in due course. Mr. H. Morrison, the leader of the Labour group in the Council, said that the fight against the Bill would be continued in the House of Commons.

Russian Orders for Sweden.

It is reported from Stockholm that the Russian authorities are in negotiation with Swedish firms for the delivery of turbine equipment for power stations. Lindquist and Holm and the Karlstad Mech. Verkstad, which supplied the turbines for the Volkhof hydro-electric works, are said to "have received considerable cash payments from the Soviet authorities as remuneration for the machines delivered having largely exceeded the guaranteed efficiency."

A Canadian Power Merger.

A merger has been arranged between the Northern Canada Power Co., Ltd., and the Northern Ontario Light & Power Co., Ltd., subject to the approval of the shareholders at a meeting to be held in Montreal on December 10th. These two companies are both subsidiaries of the Canada Northern Power Corporation, Ltd., which owns 90 per cent. of the outstanding common stock in each case. As they both operate in the mining field of Northern Ontario, the amalgamation has been arranged with a view of effecting economies in operation, and allowing the free interchange of surplus power from one system to another. The plans provide for the formation of a new company under the title of Northern Ontario Power Co., Ltd., with an authorised capital of 25,000 $100 shares of preferred stock and 500,000 shares of no-par-value common stock, and the exchange of the securities of the new company for those of the amalgamating companies on the basis of one share of preferred stock for each preferred held, and two shares of common stock for each share of common now held by the stockholders of the Northern Ontario Light & Power Co. and three shares of common stock in the new company, for each two shares of Northern Canada Power stock outstanding.

German Enterprise in Argentina.

One of the organs of the A.E.G. announces that the Sociedad Electro-Metalurgica, Argentina, S.A., has been constituted in Buenos Aires in conjunction with the Felten & Guilleaume Company of Cologne. The company, which has acquired an existing works (Syndicato Electro-Metalurgica Argentina), is engaged on the manufacture and sale of bare and insulated conductors and machine wires, as well as high- and low-pressure cable. With the wire works is associated a metal works in which the production of copper, brass, and light metals was begun on September 3rd.

A Remarkable Electrolier.

The whole of the decorative lighting fixtures for the New Empire Theatre, Leicester Square, were executed to the architects' designs by Metro-Vick Supplies, Ltd. The fixture in the main entrance foyer (which we illustrate) is a handsome crystal electrolier 6 ft. in diameter and weighing about half a ton. This fitting has plate glass mirrors arranged round the stem in such a manner that the lights are reflected and thrown in all directions. Similar fixtures are placed in the tea lounge. In the two vestibules the fittings take the form of the famous

An Electrolier at the New Empire Theatre.

Versailles lantern. These lanterns are good examples of cast bronze work, the fine detail of the acanthus leaf being especially worthy of mention. The passages and staircase are illuminated by bulkhead fittings, these harmonising with the simple treatment of the decorative scheme. The orchestra and balcony walls are equipped with crystal brackets of a pleasing appearance.

Graybar Company to be Sold to Employés.

The New York correspondent of *The Times* reports that last week the Western Electric Company announced that at the end of this year it was going to sell all the capital stock of the Graybar Electric Company to the 2,500 officers and employés of that company. The Graybar Company is one of the largest electrical supplies companies in the world, doing an annual business of $75,000,000. It was organised in 1925 to take over the merchandising business in electrical supplies of the Western Electric Company, which is the manufacturing, supply, and warehousing organisation of the great Bell Telephone system. The American Telephone & Telegraph Company owns 98 per cent. of the Western Electric Company's stock. The decision of the Western Electric Company to sell the Graybar Company means that henceforth the Western Electric concern will devote practically all its energies to the production of supplies for the rapid expansion of its controlling company's telephone business. Officers and employés of the Graybar concern will have the option of buying the shares in their company through immediate purchase or by one of two instalment purchase plans.

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Book Notices.

"Coal Distillation." Pp. 16; figs. 13. London: Babcock & Wilcox, Ltd.—A pamphlet (No. 919, September, 1928) containing a fully illustrated description of the "Babcock" coal distillation system, combining the carbonisation of coal at low temperature with steam raising for electricity generation and the recovery of by-products from the fuel. The chart of by-products and balance sheet of the results obtained are of interest, the plant having been in operation at the Dunston power station of the Newcastle-upon-Tyne Electric Supply Co., Ltd., during the past three years on a sufficiently large scale to ensure reliable data.

"Handbook of Procedure and Evidence in Arbitrations," by W. T. Creswell. Pp. xvii+167. London: The Institute of Arbitrators (incorp.). Price 6s. net.

The Report of the Proceedings of the Fifth Annual Conference of the Association of Special Libraries and Information Bureaux, held at Oxford in September, is ready, and can be obtained from the Association, price 5s.

"The Spectroscopy of the Extreme Ultra-Violet," by T. Lyman. Pp. vii+160; illustrated. London: Longmans, Green and Co., Ltd. Price 10s. 6d. net.

Messrs. Ernest Benn, Ltd., have sent us a classified catalogue of scientific and technical books, containing a number of works on electrical and allied subjects.

"Quarterly Bulletin of the British Cast-Iron Research Association." No. 22. October, 1928.

Trade Announcements.

The head office of the MOND NICKEL CO., LTD., is now at Imperial Chemical House, Millbank, S.W.1. Telephone: Victoria 4444; telegrams: "Nictatio, Phone, London."

Mr. ALEXANDER THOMSON, 57-58, Chancery Lane, W.C.2, has been appointed London agent for the Artic Fuse & Electrical Mfg. Co., Ltd.

The ROTARY ENGINEERING Co. has removed from 107, West Nile Street to 60-62, West Regent Street, Glasgow.

Messrs. J. L. GOTTLIEB & Co., LTD., have appointed the British Electrical & Manufacturing Co., 187, St. Vincent Street, Glasgow, as their Scottish agents.

In order to handle the increasing business in the Northern area more expeditiously, the Newcastle branch offices of SIEMENS ELECTRIC LAMPS & SUPPLIES, LTD., have been moved to larger premises at 44a, Westgate (telephone: Central 6841). The whole of the building is occupied by the company, and comprises well-appointed offices, showroom, trade counter, and stores.

The Newcastle office of the ENGLISH ELECTRIC CO., LTD., at present situated at Collingwood Buildings, will, on and after November 17th, be located at Carliol House, Newcastle-on-Tyne. (Telephone: Central 3033-4; telegraphic address: "Enelectico, Newcastle-on-Tyne.")

Great Britain's Radio Exports.

The *Wireless Trader* reports that during August last radio apparatus valued at £69,974 (valves £12,617) was exported from this country. The principal market was Australia, whose share amounted to £11,318 (valves £3,917). The value of the goods taken by India and Burma was £11,105 (valves £344), and the next in order was the Netherlands, £6,161 (valves £155). Other important customers were Spain, £4,830 (valves £31); France, £3,781 (valves £8); New Zealand, £2,648 (valves £658); the Irish Free State, £2,575 (valves £1,579); Norway, £2,473 (valves £544); and Belgium, £2,009 (valves £61).

Modern Lighting Installations.

The accompanying illustration (fig. 1) shows an apartment in the Royal Palace Hotel, Kensington, in which the illumination is provided by G.E.C. fittings which strike a new note in hotel lighting. The company designed the fittings in collaboration with Mr. Oliver P. Bernard.

Fig. 1.—Lighting at the Royal Palace Hotel, Kensington.

Fig. 2 illustrates an installation of an entirely different character. This is in a city wholesale fancy drapery warehouse. The fittings employed are the new Siemens "Ultralite" three-ply glassware enclosed units. A glass canopy is employed instead of metal, as usual, and ventilation is provided at the base of the canopy, which can be lifted for lamp replacement or cleaning. The work was carried out by Electricity Services, Ltd.

Fig. 2.—A Drapery Warehouse Installation.

Bankruptcy Proceedings.

W. R. GRIGSBY (trading as The Wenham Lighting Corporation), electrical factor, 184, Gray's Inn Road, W.C.—An application was made on November 9th to Mr. Registrar Francke at the London Bankruptcy Court for an order of discharge on behalf of this bankrupt, who failed in June, 1925. Mr. E. Parke, Official Receiver, reported that the provable debts amounted to £2,635; the estate had been realised by Mr. E. H. Hawkins as trustee, and had yielded £779, out of which a dividend of 4s. 6d. in the £ had been paid. The bankrupt in 1911 took over his father's business of a gas lamp manufacturer and paid the creditors 5s. in the £. He added to the business that of a factor of electrical goods. In 1924 he entered into partnership with a Mrs. Clark for the purpose of carrying out electrical work at the British Empire Exhibition, and executing orders for material obtained thereat, that business being carried on as "Clark & Co." On April 1st, 1925, the bankrupt executed a deed of assignment and was subsequently employed by the trustee thereunder. He attributed his insolvency to lack of capital, bad debts and depreciation in the value of stock. The discharge was suspended for four weeks on statutory grounds.

T. BARNETT, 934, Woodborough Road, Mapperley, &c., electrical contractor.—The public examination of this debtor was held recently at the County Court House, Nottingham, when a statement of affairs was presented which showed liabilities of £1,931, and a deficiency of £1,573. The debtor stated that he started a wireless business, and later took up electrical installation work, but he had had no practical experience. He had opened branches. A friend put £500 into the business, on the agreement that he was to be given regular employment and have a third of the profits. Later this friend found another £200, guaranteeing a like sum at the bank. The debtor attributed his failure to loss on contracts owing to want of experience, loss by slump in the wireless trade, loss on motor-car transactions, illness expenses and bad debts. The examination was adjourned for closing.

J. CAVE and T. W. BOWLER, trading as Taylor & Wynne, Back 180, Green Lane, Small Heath, Birmingham, electrical engineers.—The public examination of these debtors was held on November 7th, at the Court House, Birmingham, when a deficiency of £471 was disclosed. The debtors attributed their failure to bad trade. The examination was adjourned.

R. YEEND, electrician, 57, West Street, Wisbech, and Red Lion Street, Spalding.—Receiving order made November 6th, on debtor's own petition.

R. H. WARMINGTON, electrical engineer and contractor, 26, Stackpool Road, Southville, Bristol.—First meeting November 21st, at the Official Receiver's Office, 26, Baldwin Street, Bristol. Public examination, December 14th, at the Guildhall, Bristol.

H. C. WINGFIELD, electrician, 47, Carholme Road, Lincoln.—Trustee, Mr. F. C. Brogden, Official Receiver, 10, Bank Street, Lincoln, released October 31st.

A. LAWRIE (Houchin & Lawrie), electrical engineer, 9, Melbourne Parade, Palmers Green.—Last day for proofs for dividend, November 24th. Trustee, Mr. T. Gourlay, 29, Russell Square, W.C.

C. S. HILL (Sanderson Hill & Co.), electrical factor, Waltham Chambers, Waltham Street, Kingston-upon-Hull.—Last day for proofs for dividend, November 24th. Trustee, Mr. W. B. Hall, National Provincial Chambers, Silver Street, Hull.

C. K. Hanbury, electrical engineer, 20, Padiham Road, Burnley.—Receiving order made November 3rd, on debtor's own petition. First meeting November 19th, at the Official Receiver's Office, District Bank Chambers, Blackburn. Public examination, December 4th, at the County Court House, Burnley.

F. G. Wheeler, electrical engineer, Wynchwood, Broadlands Avenue, Shepperton.—Receiving order made November 1st, on a creditor's petition.

H. V. Charley (Dinas Powis Electrical Supply Co.), electrical engineer, Station Road, Dinas Powis.—First meeting held November 14th, at 34, Park Place, Cardiff. Public examination December 13th, at the Law Courts, Cardiff.

F. W. Smith, electrical engineer, 45, Browning Street, Leicester.—First meeting held November 14th, at the Official Receiver's office, 1, Berridge Street, Leicester; public examination December 7th, at the Castle, Leicester.

J. V. Westnutt, electrical engineer, High Street North, Dunstable.—First meeting held November 13th, at the Official Receiver's Offices, The Parade, Northampton; public examination November 16th, at the Court House, Luton.

F. C. Sprague, electrician, 44, Victoria Avenue, Mumbles, Swansea.—First meeting November 16th, at the Official Receiver's Offices, Government Buildings, St. Mary Street, Swansea; public examination November 30th, at the Town Hall, Swansea.

J. H. Gordon, electrical engineer, 21, Leeds Road, Ilkley.—First and final dividend of 2s. 2½d. in the £, payable November 22nd, at the Official Receiver's Office, 24, Lower Bond Street, Leeds.

Company Liquidations.

Bedale & District Electric Supply Co., Ltd.—Winding up voluntarily. Liquidator, Mr. R. W. Smith, electrical engineer, Bedale. A meeting of creditors was called for November 14th, at the Power Station, Bedale.

Broadfield Radio Co., Ltd.—Winding up voluntarily. Liquidator, Mr. R. Warren, 3, Victoria Place, Haverfordwest.

Summers Electric & Engineering Co., Ltd.—A meeting of members is called for December 20th at the offices of Messrs. Darke, Robson & Batty, 146, Bishopsgate, E.C., to hear an account of the winding up from the liquidator, Mr. F. B. Darke.

Farringdon Electrical Co., Ltd.—A meeting of members is called for December 7th at 22, Queen Street, E.C., to hear an account of the winding up from the liquidator, Mr. A. B. Neil.

Deed of Arrangement.

A. Charlesworth Peebles and R. Shaw, trading as Charlesworth Peebles & Co.—The trustee under this deed, Mr. S. H. Gillett, reports: "With regard to the question of the monies which Mr. Peebles expected to receive for services rendered to the Calgary Corporation, I very much regret to inform you that, following a complete breakdown in the negotiations in September last, the scheme of the Corporation has been abandoned, and consequently Mr. Peebles will not receive the monies which he anticipated, for services rendered, and which were to be applied to the payment of 20s. in the £ to the creditors. I have had a number of interviews with Mr. Peebles on this matter and the whole position in this connection was recently placed before the committee of inspection."

Recent Contracts.

The first 2-cycle double-acting marine Diesel engine made by the Société d'Electricité et de Mécanique, Procédés Thomson-Houston et Carels under an arrangement with the Worthington Pump & Machinery Corporation of the United States, is to be supplied to Argentina. It will be direct-coupled to a General Electric (U.S.A.) alternator, and installed in the Cordoba power plant, which is one of the central stations of the Herlitzka group in Argentina.

The Sheffield Coal Co., Ltd., Beighton, Yorks., has placed an order with Messrs. Simon-Carves, Ltd., for two water-tube boilers, each capable of evaporating 30,000 to 40,000 lb. per hour at 210 lb. pressure, together with four unit type pulverisers for pulverised fuel firing. In addition, the boilers are to be equipped for coke oven gas firing, and four "Eickworth" patent furbo gas burners are to be supplied for each boiler. The contract also includes superheaters, economisers, valves, fittings, instruments and feed pumps, a gas booster, two 20-ton coal bunkers, an elevator and a conveyor, and a complete new boiler-house building.

The General Electric Co., Ltd., has just installed a number of electric cooking appliances in the West Ham Union Central Home at Leytonstone. Provision is made in the kitchen to cater for about 2,000 persons daily. The "Magnet" equipment includes a large cabinet type roasting oven, a fish fryer, and a hot cupboard, with carving table. A contract has recently been placed by the War Office with the company for the supply of "Pearl Osram" gasfilled lamps for use in various home stations.

Foreign Loans in the United States.

Among the loans raised in New York on behalf of foreign Governments, private undertakings, &c., during the third quarter of the current year were the following: The Rhenish-Westphalian Electric Power Corporation, $12,500,000; the Foreign Light & Power Co. (Switzerland), $5,000,000; and the Gatineau Power Co. (Canada), $7,500,000.

New Catalogues and Lists.

Metro-Vick Supplies, Ltd., Trafford Park, Manchester.—A small illustrated and priced pamphlet describing "Met.-Vick" electric lighting fittings of many designs, arranged for overprinting.

The General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.—An artistic catalogue containing illustrated particulars and prices of modern style electric lighting fittings; and Publication F.4822, dealing very fully with the company's floodlighting equipment, giving illustrations of actual installations.

Messrs. Petters, Ltd., Westland Works, Yeovil.—Publication No. 1542, illustrating and describing typical examples of the company's engines, combined with air compressors, pumps, generators, &c.

The Underfeed Stoker Co., Ltd., Africa House, Kingsway, W.C.2.—A well-produced catalogue describing in some detail the design, construction and employment of the "Type L" stoker.

The Electric Heating Co., George Street, Croydon.—A 1928-29 catalogue of "Elect" cooking and heating appliances. Illustrated and priced.

Messrs. A. W. Beuttell, Ltd., 96, Victoria Street, S.W.1.—A priced and illustrated catalogue of "Linolite" and "K-Ray" fittings for a number of purposes.

The Chloride Electrical Storage Co., Ltd., Clifton Junction, near Manchester.—An illustrated pamphlet describing the "Keepalite" emergency lighting system, which employs the company's batteries and a special form of control panel.

The Gregson Manufacturing Co., Ltd., 31, Tenby Street, Birmingham.—A 28-page catalogue containing illustrated details and prices of many examples of the company's wood electric lighting fittings—candelabra, pendants, shade and bowl fittings, &c.

Siemens Electric Lamps & Supplies, Ltd., 38-39, Upper Thames Street, E.C.4.—A folder containing illustrations, details and prices of various models of "Cosyglo" electric "coal" fires.

The Universal Electric Lamp Co., 89, Great Eastern Street, E.C.2.—A net wholesale price list of switches, lampholders, table standards, shades, distribution boards, cables and wires, &c.

Volta, Ltd., 36-38, Kingsway, W.C.2.—Two priced and illustrated folders dealing, respectively, with the company's "S.M.II" and "Volta V" vacuum cleaners.

Callender's Cable & Construction Co., Ltd., Hamilton House, Victoria Embankment, E.C.4.—A well-illustrated descriptive catalogue of distribution equipment, including h.p. and e.h.p. joint boxes of various types.

Messrs. Gent & Co., Ltd., Faraday Works, Leicester.—Book 7, Section 2a, dealing with the company's electro-motor sirens and far-reaching sound signals.

Ateliers de Constructions Electriques de Charleroi, 56, Victoria Street, S.W.1.—November stock list of motors and dynamos.

Messrs. Campbell & Isherwood, Ltd., Raleigh Street Works, Bootle, Liverpool.—An illustrated pamphlet dealing with "S.D.L." mechanical refrigerators.

The T.B.T. Electric Co., Ltd., 171, Queen Victoria Street, E.C.4.—An illustrated pamphlet dealing with three-phase transformers and a stock list of d.c. and a.c. motors.

Messrs. Ruston & Hornsby, Ltd., Lincoln.—A mailing card illustrating "Ruston" generating sets installed in two newspaper printing works.

The Automatic Telephone Manufacturing Co., Ltd., Strowger Works, Liverpool.—A folder illustrating two examples of "Strowger" private automatic exchanges. Priced.

Unemployment.

The registers of the Employment Exchanges on October 29th showed a total of 1,374,000 unemployed. This was 30,510 more than on October 22nd, and 268,640 more than on October 31st, 1927.

The New York Electrical Exhibition.

We have received a copy of the catalogue issued in connection with the recent Electrical and Industrial Exposition held in New York. There were about 150 exhibitors, and the displays of each are described in a brief, interesting style. The whole extensive range of electrical applications was represented in the show, and the catalogue forms an excellent guide to the electrical tastes of the American public, and is an indication of the advanced stage of electrical development which has been reached.

New Belgo-Lithuanian Company.

A company has been formed in Brussels with a capital of 28,750,000 fr. and the title La Compagnie Belgo-Lithuanienne d'Electricité, to establish electricity supply undertakings in Lithuania. A number of Belgian electrical financial concerns are interested in the new undertaking.

Irish Free State Electrical Imports.

The imports of electrical goods, excluding machinery, into the Irish Free State during September last amounted to £58,020, bringing up the total for the first nine months of the year to £337,941, as compared with £279,889 in the corresponding period of 1927.

The Timber Market.

Our Timber Trade Correspondent reports that imports of woods for building and general purposes are arriving in small quantities as compared with last year, and, owing to the better deliveries, the heavy stocks recently on the market have now been reduced to less than normal. Prices for recent shipments from the North of Europe have been more attractive to importers, but transport freight and insurance have increased, and the fact that spot prices have ruled low throughout the season preclude the possibility of a drop in retail prices. On the other hand, the moderate supplies suggests a stiffening of spot prices, which is likely to become more pronounced on the closing of the shipping ports by ice. The market for mahogany, teak, satinwood, ebony, and other fancy woods continues very steady with stocks light. American lumber supplies are decreasing, both as regards imports and stocks, and rates for forward business are advancing.

The Marking of Imported Bearings and Pumps.

A draft Order-in-Council, under the Merchandise Marks Act, has been laid before Parliament. This, *inter alia*, requires the marking of imported ball and roller bearings with an indication of their origin. This indication is to be impressed or etched upon the visible surface of the outer ring of the bearing. The Order does not apply to a bearing which forms an integral part of another article. It is proposed that this part of the Order shall take effect six months from the date of its approval. The same Order provides for the marking of imported pumps; in this case the period is three months.

Leeds Work for Registered Contractors.

The Leeds Electricity Committee has considered the conditions with regard to the assisted wiring scheme and interviewed representatives of registered and unregistered electrical contractors, eventually deciding that from January 1st contracts under the scheme shall only be entered into with firms whose names appear on the National Register of Electrical Installation Contractors.

Prices of Materials.

The following prices are only general, and they may vary according to quantities and other circumstances :—

	CHEMICALS, &c.		Price Nov. 13th.	Fortnight's inc or dec.
a	Acid, Oxalic	per lb.	8½d.	...
a	Ammoniac, Sal	per ton.	£60	...
a	Ammonia, Muriate (large crystal)	,,	£52	...
a	Bisulphide of Carbon	,,	...	...
a	Borax	,,	£25	...
a	Copper Sulphate	,,	£25 10s.	...
a	Potash, Chlorate	per lb.	9½d. to 4d.	...
a	,, Perchlorate	,,	5½d.	...
a	Shellac	per cwt.	£13 10s.	...
a	Sulphur, Commercial	,,	£11	...
a	,, Roll	,,	£11	...
a	Soda, Chlorate	per lb.	8d.	...
a	,, Crystals	per ton.	£5 to £5 5s.	...
a	Sodium Bichromate, casks ...	per lb.	8½d.	...
	METALS, &c.			
b	Aluminium, Ingots	per ton.	£95 to £100	...
b	,, Wire	per lb.	1/8 to 1/9	...
b	,, Sheet	,,	1/8 to 2/9	...
p	Babbitts Metal and Anti-friction Metal—			
	Grade I	per ton net.	£206	£4 inc.
	Grade II	,, ,,	£142	£1 inc.
	Grade III	,, ,,	£76	...
c	Brass (rolled metal 2" to 12" basis)	per lb.	10½d.	½d. inc.
c	,, Tubes (solid drawn)	,,	1/- to 1/0½d.	...
c	,, Wire, basis	,,	10½d.	½d. inc.
c	Copper Tubes (solid drawn) ...	,,	1/1½	...
c	,, Bars (best selected) ...	per ton.	£98	...
c	,, Sheet	,,	£98	...
c	,, Rod	,,	£96	...
d	,, (Electrolytic) Bars ...	,,	£74 5s.	...
d	,, ,, Sheets ...	,,	£143 10s.	...
d	,, ,, Wire Rods	,,	£84 5s.	...
d	,, ,, H.C. Wire	per lb.	1 ½d.	...
f	Ebonite Rod	,,	2/8 to 2/8	...
f	,, Sheet	,,	2/8 to 2/8	...
n	German Silver Wire	,,	2/2	...
h	Gutta-percha, fine	,,	nom.	...
h	India rubber, Para fine	,,	11d.	...
l	Iron Pig (Cleveland No. 3.) ...	per ton.	66/-	...
l	,, Wire, galv. No. 8. P.O. qual.	,,	£91	...
g	Lead, English pig	,,	£23 5s.	2/- dec.
g	Mercury	per bot.	£23 to £23 5s.	...
e	Mica (in original cases) small ...	per lb.	3d. to 8/-	...
e	,, ,, medium	,,	4/- to 8/-	...
e	,, ,, large ...	,,	10/- to 20/- & up	...
p	Phosphor Bronze, plane castings	,,	1/8½	...
p	,, ,, drawn bars & rods	,,	1/8½	½d. inc.
p	,, ,, rolled strip & sheet	,,	1/8½	½d. inc.
p	,, ,, wire...	,,	1/4½	½d. inc.
o	Platinum	per oz.	£16	£1 dec.
d	Silicium Bronze Wire	per lb.	10½d.	...
r	Steel, Magnet, in bars	,,	7½d.	...
m	Tin, Block (English)	per ton.	£227 10s. to £228	35/- to 40/- dec.
n	,, Wire, Nos. 1 to 16	per lb.	8/8	...

*For 1 cwt. lots. Special quotations against definite specifications.

Quotations supplied by

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
m P. Ormiston & Sons.
n Johnson, Matthey & Co., Ltd.
o C. Clifford & Son, Ltd.
p W. F. Dennis & Co.

Patents and Trade Marks in Mexico.

The Mexican Government announces that as from January 1st all existing laws relating to patents and trade marks will be abrogated, and two new laws, one relating to trade marks and commercial advertisements and the other to registered names and patents, will come into force. These laws will be framed to correspond as closely as possible with the various treaties to which Mexico is a signatory.—*Reuter's Trade Service* (Mexico City).

Registered Electrical Contractors.

Applications from the following for registration were accepted by the Executive Committee of the National Register of Electrical Installation Contractors at its last meeting :—

Southwood, J. T., Plymouth.
Burden, J., & Son, Alcester.
Fisher, C. C., Norwich.
James Bros., Trowbridge.
Dome Electric Co., Manchester.
Thorpe & Bosco, Ltd., Golden Square, W.1.
Woodgate & Elsworth, Ltd., High Halden, Kent.

Between 40 and 50 applications are now in course of investigation.

Polish Foreign Electrical Trade.

According to the *Board of Trade Journal*, during August last Poland imported "apparatus, conductors and other electro-technical materials" to the value of 8,855,000 zloty (£206,000 approximately). During the same month Poland's exports of these products were valued at 40,000 zloty (£900 approximately).

New Italian Companies.

Among the undertakings recently organised in connection with electricity supply in Italy are La Unione Internazionali Produttori Energia Elettrica, Cuneo, capital 3,000,000 lire, to establish a hydro-electric plant to utilise the power of the River Ellero; La Società Idro-Elettrica Fiastrone, Rome, capital 1,000,000 lire; La Società Illuminazione Regionali, Rome, capital 100,000 lire; and La Società Idroelettrica Venaschese, Venasca (Cuneo), capital 1,200,000 lire.

Swiss Complaints of Unsound Competition.

In the course of the report for 1927-28, of the Oerlikon Machinery Company, which has declared a dividend of 8 per cent. as in the previous year, the directors complain of the continuance of unsound competition in the supply of electrical machinery. This situation, it is said, is successfully utilised by customers in demanding unreasonable technical guarantees and shorter periods for delivery.

Local Exhibition.

Swansea.—An electrical exhibition, opened on November 8th, is being run by the Corporation until to-morrow (Saturday). An attractive feature of the show is a display of colour-lighting as an artistic medium in dramatic presentations. This has been devised by Mr. R. G. Williams and "Holophane" apparatus is employed.

Indian Electrical Imports.

The imports of "electrical equipment" into India during August last attained a value of 4,500,000 rupees as compared with only 2,143,000 rupees in the corresponding month of 1927.

New German Company.

With the title Die Kelvinator Elektro-Kuhlanlagen Gesellschaft, a new company has lately been formed in Leipzig to manufacture "Kelvinator" electrical refrigerators in Germany.

The Development of Portuguese India.

The Government of Portuguese India is preparing to issue a 2,000,000-rupee 5 per cent. internal loan, redeemable in 35 years, for water, electricity, and drainage schemes in Nova Goa.—*Reuter.*

Lighting and Power Notes.

Canada.—Electrical Development.—Following out plans for extension of the provincially-owned electric power lines over the entire southern part of Manitoba, the Manitoba Power Commission is now arranging for distribution over a considerable area near the western boundary of the Province, with Virden as the central point. The power station at Virden is being enlarged and plant installed to supply electricity to about a dozen towns and villages in this neighbourhood, as well as farms in the territory. The programme provides for ultimate linking up with the Provincial hydro-electric system gradually being extended westerly from Winnipeg.

The High Commissioner for Canada in London has received from Regina a copy of the report of the Saskatchewan Power Resources Commission appointed on January 7th, 1927, which some time back recommended to the Provincial Government the taking-over of the existing privately-owned power plants

in the Province and their linking up in a Government-owned and operated scheme somewhat similar to that in operation in the Province of Ontario.

The Vancouver correspondent of the *Financial Times* reports that the West Kootenay Power & Light Company has published plans for the new Pend Oreille plant, which show that it will be one of the largest electrical undertakings in Western Canada, and that it will cost $4,000,000. The new plant will equal in magnitude the British Columbia Power Corporation's initial development on the Bridge River. The production of 80,000 h.p. has been decided upon as its objective. The great developments in smelting at Trail and other British Columbian industries have made additional power a necessity, and by the time the new plant is ready all the power it can produce will be required. The plant will take two years to complete.

Chelmsford.—ELECTRICITY CHARGES.—In reply to a letter from the Town Council, Mr. K. A. Scott Moncrieff, managing director of the Electric Supply Corporation, Ltd., has written stating that the company is quite unable to meet a suggestion to reduce the charges for electricity for all purposes. He says that negotiations for a supply of electricity in bulk had fallen through, and the company was now preparing plans for additional generating plant. The supply of electricity for domestic purposes at 1½d. per kWh was hardly possible for Chelmsford. To supply at any considerable reduction of the present rates the company would have to lay down additional generating plant, mains, and other apparatus. There was also the question as to how far it was advisable to extend the system of supply at a frequency of 100 cycles when there was every likelihood of its being changed before long to 50 cycles.

Colchester.—ELECTRICITY IN BULK.—At a recent meeting of the Corporation Electricity Committee correspondence was submitted with regard to obtaining a supply from the Clacton Town Council and the furnishing by the Colchester Corporation of a bulk supply to the Walton Urban District Council. The Town Clerk was asked to inquire from the Clacton Council its terms for a bulk supply and the point at which the supply would be furnished:

STREET LIGHTING.—The Corporation Lighting Committee has arranged to substitute electricity for the oil street lamps at Lexden.

MAINS EXTENSIONS.—The Electricity Committee is to carry out mains extensions at a cost of £1,200.

Continental.—ALBANIA.—On November 5th, the streets of Tirana, the capital of Albania, were lit for the first time by electricity. The works which supply electricity have been built entirely with Albanian capital, and are among the most up-to-date in Eastern Europe. Great public interest was taken in the official inauguration of the new system, the Prime Minister setting the generating plant in motion.—*Reuter* (Tirana).

FRANCE.—The electricity supply of Paris and its suburbs is in the hands of three undertakings—the Compagnie Parisienne de Distribution d'Electricité, l'Union d'Electricité et la Société de l'Electricité de Paris, and the Société de l'Electricité de la Seine. The first of these companies, being unable to increase its own plant, has recently arranged to take supplies from the distributing mains of the other two. The Société de l'Electricité de Paris and the Seine Co. are also arranging to link up their respective stations. The output of the Société de l'Electricité de Paris from its power station at St. Denis amounted to 282,633,812 kWh in 1927, as against 134,357,660 kWh ten years ago.

GERMANY.—The Rhenish-Westphalian Electricity Co. has recently purchased the two hydro-electric plants and also a steam-operated power station belonging to the municipal authorities of Treves, and has contracted to supply the town with electricity during a period of thirty years. Since the financial reorganisation in Germany, the majority of shares in the Rhenish Co. have passed into the hands of municipal authorities, who, through their representatives, now control the policy of the company.

Coppenhall.—ELECTRICITY SUPPLY.—A canvass of probable consumers having proved satisfactory, the Parish Council has arranged with the Crewe Corporation for a supply of electricity by means of an overhead main. The charge for lighting will be 6d. per kWh.

East Cornwall.—ELECTRICITY IN BULK.—The East Cornwall Electric Supply Co., which has applied to the Plymouth Corporation Electricity Committee for a bulk supply of electricity for the Saltash and Torpoint areas, has been informed that the Committee is prepared to provide a supply and that the matter has been referred by the Committee to the chairman of the Committee, the engineer and the town clerk, for negotiation and report.

East Grinstead.—LOANS.—Application is being made by the Urban District Council for sanction to loans of £6,000 for mains and services, and £500 for meters.

Hastings.—LOAN SANCTIONED.—The Corporation Electricity Committee has received sanction to a loan of £10,000 for meters.

Irish Free State.—ELECTRICAL DEVELOPMENT.—Good progress has been made with the electrical installations in the South-Eastern Counties of the Free State under the direction of the Electricity Supply Board, and it is anticipated that most of the towns in Leinster will be lighted by electricity from the Dublin power house by Christmas. The Waterford electricity system has now been taken over, and the lighting of that city from Dublin will begin early next month. The Leinster towns will receive a supply from Dublin as the distributing network is completed. The main trunks are already completed throughout Leinster.

THE SHANNON SCHEME.—The *Financial Times* reports that the Shannon electricity scheme has made such good progress that there is every prospect that it will be brought to the productive stage next autumn as anticipated. The balance sheet of the undertaking, made up to March 31st last, shows that out of the estimated total of £5,200,000 just over £2,500,000 has been expended, and since then appropriations have provided a further £600,000. The main works at Ardnacrusha and O'Brien's Bridge absorbed nearly £900,000 during the past year, as against £300,000 up to 1926-27, and the distribution system took over £500,000, as against close on £600,000. The major amount spent under the latter head was chiefly on transmission lines. Meanwhile, the Electricity Board is carrying on active propaganda to habituate people to the idea of electricity and to prepare them for its use in detail directly it is ready. The Ministry for Agriculture favours the establishment of an experimental farm to demonstrate how readily electricity can be utilised in saving labour in practically all the varied activities of husbandry.

Leeds.—LOANS.—The Corporation Electricity Committee has obtained sanction to the borrowing of £50,000 for buildings and works at Kirkstall power station, £150,000 for plant, and £35,000 for the assisted wiring scheme.

Application is to be made for sanction to loans of £400,000 for mains, and £50,000 for sub-station equipment.

Leiston.—INAUGURATION OF SUPPLY.—An electricity supply for the district was formally inaugurated on October 9th. The supply is provided by the East Suffolk Electricity Distribution Co., Ltd., and the resident manager is Mr. H. S. Prowse.

London.—SOUTHWARK.—In his annual review the Mayor mentioned that the electricity undertaking had completed another successful year with a profit of £16,659. The number of consumers had been considerably augmented and the demand increased all round by 500,000 kWh. Generating expenses had been reduced from 2.92d. to 2.13d. per kWh, which would enable the Council to make an immediate reduction in the price to consumers. Negotiations were being continued in connection with a bulk supply, and meanwhile arrangements had been made to maintain an efficient supply at a price which compared favourably with other electricity supply undertakings in the London area.

Manchester.—EXPLOSION.—An explosion occurred at the corner of Dowing Street and Russell Street on November 12th, which lifted paving stones and shattered shop windows. The cause was a fault on an underground cable.

Oldham.—LOAN.—The Corporation Electricity Committee is to apply for sanction to a loan of £70,000, the estimated cost of the tie and interconnecting mains between the new generating station and the existing e.h.p. distribution system.

Otley.—STREET LIGHTING.—The Urban District Council has adopted a scheme for street lighting by electricity by arrangement with the Yorkshire Electric Power Co. for a term not exceeding 15 years.

Plymouth.—MAINS EXTENSIONS.—The Corporation Electricity Committee has authorised mains extensions at a cost of £3,800.

Romsey (Hants.).—INAUGURATION OF SUPPLY.—An electricity supply for the district was recently formally inaugurated by Mrs. Wilfrid Ashley. The supply is provided by the West Hampshire Electricity Co., Ltd., and the resident manager is Mr. G. T. Garwood.

Rugeley.—INAUGURATION OF SUPPLY.—An electricity supply for the district was formally inaugurated on November 9th by Mr. J. Cadman, chairman of the Brereton Collieries, Ltd. The supply is obtained from the local colliery, and the scheme has been carried out by the Trent Valley & High Peak Electricity Co., Ltd. The resident manager is Mr. C. Jones. An electrical exhibition was held at the Town Hall on November 9th and 10th.

Sheffield.—LOAN SANCTIONED.—The Corporation Electricity Committee has received sanction to a loan of £500,000 for distributing mains.

MAINS EXTENSIONS.—The Committee is extending mains at a cost of £12,363.

Sittingbourne.—ELECTRICITY IN BULK.—The manager of the Maidstone Corporation electricity works has informed the Urban District Council that the Corporation is willing to provide a bulk supply of electricity for the district, and the matter is to be considered at a special meeting.

South-East Lancs. Electricity Advisory Board.—OPERATING STATISTICS.—Operating statistics for the quarter ended June last show that the total costs of generation, &c., was £237,460, and the cost per kWh to feeders, 0.257d., the total energy delivered to the feeders being 221,400,347 kWh.

EXTENSIONS AT SALFORD.—The Electricity Commissioners have sanctioned the installation of two 100,000-lb. boilers at

Agecroft station, instead of two 65,000-lb. boilers, as originally proposed.

FRINGE ORDERS.—The Engineering Advisory Committee has recommended the Board to support the applications for Fringe Orders by the Electricity Co. of Macclesfield, Ltd., to supply certain premises beyond Macclesfield borough boundary, and the Cheadle and Gatley Urban District Council to supply certain houses in Northen Etchells.

TRANSMISSION LINES.—The Board has been recommended to approve the construction by Stretford Urban District Council of two transmission lines between the Barton power station of the Manchester Corporation, and the Council's Trafford station. The estimated cost of the scheme is £30,000.

The minutes of the proceedings of the Engineering Advisory Committee have been approved by the Board.

Southend-on-Sea.—ELECTRICITY IN BULK.—The *Southend Standard* reports that the Corporation will be ready to receive a bulk supply of electricity during next month. Electricity will be supplied from the Barking station of the County of London Electricity Supply Co., Ltd. Work is nearing completion on the erection of a 33,000-V h.p. overhead transmission line from Tilbury to Leigh, a distance of approximately 18 miles, and the work will include the laying of a submarine cable under the bed of Pitsea Creek at a depth of five feet. The scheme is being carried out by Messrs. W. T. Henley's Telegraph Works Co., Ltd.

Special Orders.—The Lancashire Electric Power Co. has applied to the Electricity Commissioners for a Special Order authorising it to supply electricity in the urban districts of Blackrod, Croston, and Withnell, the rural district of Chorley, and parts of the rural district of Preston.

The Minister of Transport has confirmed a Special Order made by the Electricity Commissioners authorising the Power Development Co., Ltd., to supply electricity in the borough of Romsey, the rural districts of Romsey and New Forest, and part of the rural district of Lymington.

Stalybridge.—CHAGNE-OVER.—Instructions to change over the periodicity of its plant from 40 to 50 cycles have been received from the Central Electricity Board by the Stalybridge, Hyde, Mossley and Dukinfield Tramways and Electricity Board. At a recent meeting Ald. J. Bottomley (chairman) said the alterations would cost about £450,000, which would eventually be returned by the Central Electricity Board. Although it was given a few years to carry out the work, the Board would have to take action almost immediately.

Twynholm (Kirkcudbright).—HYDRO-ELECTRIC SCHEME.—At a recent meeting Colonel Maitland of Dundrennan referred to the scheme for the harnessing of the Dee. He said the Bill to carry out the scheme would shortly come before the House of Commons. It was intended to bring water from Loch Doon into the upper reaches of the Ken and to make a series of dams to just above Dalry with a power station at each. This scheme was, he thought, the fifth big work of its kind in Scotland, and would supply electricity to the main line running from Carlisle to Glasgow. The promoters proposed to carry the electricity to the main line at Dumfries and from there it could be transmitted to Glasgow and other populous districts. They were not undertaking to distribute it locally. He asked that the County Council and the local M.P. should see that they were safeguarded and would get a share of the electricity at such a cost that it could be distributed at a reasonable price to the community.

Tynemouth.—YEAR'S WORKING.—The report of the borough electrical engineer (Mr. C. Turnbull) on the working of the undertaking for the year ended March 31st last shows a total revenue of £62,933, as compared with £64,444 in the preceding year. Working expenses amounted to £42,447, as against £45,719, and after payment of capital and other charges there was a net surplus of £6,757, as compared with £6,239 in 1926-27. A contribution of £1,776 was made to the borough fund. The sales of electrical energy increased from 7,407,027 to 7,676,098 kWh, and the average price obtained per kWh fell from 1.86d. to 1.83d. The installations connected to the system under the assisted wiring scheme totalled 1,800 at the end of the year.

Tramway and Railway Notes.

Continental.—SWITZERLAND.—The electrification of the mountain railway from Viège to Zermatt has been decided upon by the Conseil d'Administration. The whole line, 35 miles in length, is to be completed by June 1st next. The system of supply will be 16⅔ cycles, single-phase, at a pressure of 11,000 V. Electricity will be supplied by the Swiss Federal Railways, and delivered at Viège. A new section of the line Viège-Brigue, about 10 miles in length, will be installed parallel to the work of electrification on the Viège-Zermatt, so that the Furka line will thus be linked up direct with the latter.

What is described as the largest open-air transformer station in Switzerland has recently been completed by the Oerlikon Maschinenfabrik at Rapperswill, Canton of Aarau, for the Swiss Federal Railway authorities. It forms the connecting point for four hydro-electric generating stations—at Ritom and Amsteg on one side, and Barberine and Vernayaz on the other. At present three transformers have been installed, but later the number is to be increased to six. Power is received at a pressure of 132,000 V and stepped down to 66,000 V, at which pressure it is transmitted to sub-stations at Brugg, Olten and Rothkreuz, where it is further reduced to 15,000 V.

RUSSIA.—Some particulars are now available of the electric railway which was opened about two years ago between Baku, on the Caspian Sea, and the petroleum wells at Sabuntschi and Surachany. The line is about 20 miles in length, of which 8½ miles is double track. There is a station every two miles along the line, and trains run at regular intervals of from 17 to 20 minutes. The power is supplied from the Naphtha Works Co.'s power station, the 20,000 V a.c. being converted to 1,350 V d.c. at two sub-stations.

Haslingden.—PROPOSED ABANDONMENT OF TRAMWAY.—At a meeting of the Town Council, on November 9th, the new Mayor said that by March, 1930, the net outstanding debt on the tramway would be reduced to £3,000, and he suggested that the Council should discontinue the trams and substitute motor-'buses by that date.

London.—DISTRICT RAILWAY JUBILEE.—The Underground Electric Railways Co. of London, Ltd., marked the District Railway Diamond Jubilee (1868-1928) by introducing a new type of train: its method of introduction to the public was somewhat novel, for an exhibition of rolling-stock consisting of a steam locomotive (1868-1905), steam passenger coach (1868-1905), "Southend" electric locomotive (1905), an all-wood electric car (1905), an all-steel electric car (1920), and the latest type electric car (1928) was arranged to form a Diamond Jubilee train, stabled in Platform No. 4 at South Kensington station (District Railway) for the week commencing Monday, November 5th, from 9 a.m. to 9 p.m. each day. The public was able to inspect it (free of charge), and at close quarters review the principal changes in design which have been made through the years. The railway staff which was in charge of the train included some who operated the old steam trains on the District Railway. An illustrated booklet, which had been specially prepared for the public and the Press, gave fullest details of the new car and its predecessors.

DOUBLE BOOM CARS.—The Metropolitan Electric Tramways Co. is experimenting with a car fitted with a trolley boom at each end of the vehicle, instead of the usual one arm in the centre only. It is expected that the employment of two booms will speed up the changing-over of cars at the termini and likewise eliminate the necessity for cutting off the lighting of the car when the single arm is swung round from one cable to another. If the experiment is successful it is likely that the double-boom system will be installed on all cars.

Southern Railway Electrification.—The *Financial News* reports that the conversion of the old L.B. and S.C.R. section of the Southern Railway's electric suburban lines from the overhead to the third rail system is due to be completed by March next, and the directors of the Southern are now considering, in consultation with their technical advisers, which part of the steam service shall be electrified next. Several sections of the suburban line have been discussed, but it is officially stated that none has been definitely selected. It is understood that one section concerning which preliminary information has been laid before the Board is that between Guildford and Dorking, on the former South-Eastern and Chatham line. Another possibility which is being explored is the linking up of the electric service between Redhill and London Bridge. If either of these schemes is undertaken a natural sequence would be the eventual linking up of Dorking with Redhill. This would complete a circle, and would tap many residential districts, which have grown enormously of late years, and are now served by steam trains. Eventually the Southern may extend its electric lines to Chatham, Gillingham, and other populous centres. There are still in the suburban area, within the network of the Southern electric services, several short portions of track over which only steam trains run, and it is therefore considered probable that the directors will decide upon the conversion of these portions of their line before embarking on any of the larger schemes.

Telegraph and Telephone Notes.

China.—RADIO-TELEGRAPHY.—The recent conclusion of an agreement between the National Government and the Radio Corporation of America indicates an effort on the part of the Chinese to end the long controversy on the development of wireless telegraph in which the United States, Japan, and Great Britain have been engaged. According to *The Times*, seven years ago an American concern, which has since become associated with the Radio Corporation, contracted to install one central and five feeder stations at a cost of $13,500,000 (£2,700,000) on terms which appeared to ensure an American monopoly of wireless in China to the exclusion of other interested countries. The Americans are now apparently content to cancel their former agreement in consideration of receiving

an order to install at Shanghai two 20-kW short-wave plants, at the trifling cost of $170,000 (£34,000). Whereas China a few years ago was committed to spend a great sum for a 700-kW station, plus subsidiaries, she is now to obtain an installation which will give her equal facilities for communicating with Europe and America at one-eightieth of the price, or with attendant expenses for $350,000 (£70,000), instead of $13,500,000 (£2,700,000). One plant will be used to communicate with California and the other probably with Germany, and both will be completed early in 1930. The Chinese aim at operating their foreign telegraph communications themselves, thus disposing of the monopoly hitherto held by foreigners. The Mitsui contract of 1917 is now virtually a dead-letter, as the station completed at Peking in 1921, at a cost which, with interest and expenses, exceeded £1,000,000, is practically obsolete. Whether Japan can ever recover this amount from China remains to be seen. The British and Danish cable companies' monopoly of telegraphy in China expires in 1930. The interest of the Marconi Company in China, formerly confined to wireless, is now identical with that of the cable companies.

Holland.—EAST INDIES TELEPHONE SERVICE.—Wireless telephone communication between special studios in Amsterdam, Rotterdam and The Hague, and the Dutch East Indies, are to be opened to the public on January 7th. Thirty florins will be charged for an ordinary conversation of three minutes, 60 florins for an urgent call, and 120 florins for immediate communication. Ordinary and urgent conversations will have to be booked on the previous day before 6 p.m.—*Reuter* (Amsterdam).

Irish Free State.—RADIO-TELEGRAPHY.—The Galway County Council has been informed by the Free State Government that it has decided to restore communication with Innisboffin Island, lying off the Connemara coast, Co. Galway, by means of wireless-telegraphy, which has come to be regarded as the most reliable means of communication between the mainland and the remote island.

Malaya.—CARRIER TELEPHONY.—The chief secretary, Mr. W. Peel, in his Budget speech before the Federal Council, forecast the early introduction of carrier telephony. The extent to which it is intended to extend internal communication facilities in Malaya is indicated by an order which has been placed with the Crown Agents for two complete sets of carrier telephone apparatus, one each for Kuala Lumpur and Ipoh, which is the first section which will be operated. On its success, says the *Financial Times*, will depend whether two further sections will be started next year. Being an innovation, the manufacturers, the Standard Telephones & Cables, Ltd., have been requested to send out an engineer to install the apparatus. At present the trunk lines are extremely congested, and the new installation is expected to relieve them.

Radio-telephony.—DOMINION SERVICES.—It is understood that a suggestion of the British Government to link the home country and Dominions by wireless telephony is being considered sympathetically. Investigations commenced some time ago, the idea being to extend the Rugby plant so as to afford direct two-way communication with Australia, South Africa, Canada, and India early in 1930. The present transatlantic service is maintained by means of high-power long-wave apparatus, but it has been demonstrated that it is possible to use the Marconi short-wave beam system for telephony with less power. Besides the long-wave channel working to America there has been inaugurated recently at the Cupar (Fife) receiving station a short-wave channel. A special receiving array, or system, for aerials has been erected, but as the wavelength used (which lies between 16 and 32 metres) is so small, the antenna need only be of the order of 60 yards long. A special receiver has to be used for such high frequencies, and successful working has been obtained with the system.

Switzerland.—NEW WIRELESS STATION.—The Swiss Wireless Company has decided on the construction of a wireless receiving and transmitting station near Geneva, at the cost of a million francs. It is expected that the station will be ready next summer.—*Reuter* (Berne).

The Telegraph Service.—REFORM?—After six weeks' study of United States telegraph methods, a special delegation from the British General Post Office has returned to London. The party consisted of Mr. L. Simon, secretary of the Inland Telegraph Branch, Mr. Stuart Jones, controller of the Central Telegraph Office, Col. Lee, an assistant engineer-in-chief who specialises on the wireless side, and two other technical experts. They left London on September 8th, soon after the Hardman Lever report, which severely criticised the G.P.O. telegraph system (the service loses £1,500,000 a year), and suggested drastic changes. The delegation will report to the Postmaster-General, and probably will put before him some ideas for improving the British service.

International Telephony.—NEW SERVICE.—Negotiations are being pressed forward between the General Post Office and the telephone administrations of the 18 European countries with which Great Britain is in telephonic communication for the establishment of a person-to-person service. The advantages of such a service are already available to subscribers, whether in America or Europe, who use the transatlantic telephone system. It means that in the case of a subscriber desiring direct communication with another subscriber the telephone operators will, if the necessary information is given them, endeavour to find the person wanted if he should not be at his own address when a call is made. At present about 3,000 calls are made daily between London and the Continent.

Radio Notes.

Battery Eliminators.—AN INNOVATION.—The Middlesbrough Corporation has completed arrangements whereby electricity consumers can be provided with wireless battery eliminators on a preliminary payment to the Corporation of £1, with half-yearly payments of £1 completing the purchase in five years. According to the *Wireless World*, the device has been designed by Mr. R. H. Scotson, borough electrical engineer; it can be plugged direct into an ordinary lamp socket, and will feed the anode and filament circuits of any kind of valve set. The Corporation is manufacturing the eliminators itself.

Germany.—NEW RELAY STATION.—The Flensburg station, the new Norag relay plant, has begun experimental transmissions. Its power is 1.5 kW and wavelength 219 m.

Turkey.—NEW STATION.—It has been reported that the Radio-Angora station was officially opened on November 1st, and is declared to be operating on a wavelength of 1,600 m. with 5 kW power. It is not known whether a new station is referred to, or whether the existing Angora plant (1,818 m., 20 kW) has been modified.

Contract Information.

When "Contracts Open" are advertised in our "Official Notice" pages, the date of the ELECTRICAL REVIEW containing the advertisement is given in parentheses below.

Contracts Open.

Australia.—MELBOURNE.—December 18th. Department of Posts and Telegraphs. Motor-generator sets. (B.X. 4810.)* Lamps, lamp caps and sockets. (B.X. 4918.)*

December 11th. Telephone generators. (B.X. 4812.)* Instrument cords. (B.X. 4811.)*

December 4th. Submarine telephone and telegraph cable. (B.X. 4818.)*

December 5th. City Council. Insulated fire-resisting cable. (B.X. 4822.)*

Denmark.—COPENHAGEN.—December 4th. Lighting Department. One 10,000-kVA transformer. (B.X. 4862.)*

Dublin.—December 10th. Electricity Department. E.h.p. switchgear and accessories. (See this issue.)

Edinburgh.—November 19th. Electricity Supply Department. One 1,000-kW motor convertor. (November 2nd.)

Ely.—December 1st. Rural District Council. Electric lighting installation (plant, battery, cables, &c.) for the pumping station and engineer's house. (See this issue.)

Halifax.—December 7th. Electricity Department. One 6,500-kW turbo-generator and auxiliaries and two water-tube boilers with superheaters, mechanical stokers, economisers, air heaters, feed pumps, and steel building for housing same. (See this issue.)

India.—November 30th. South Indian Railway Co., Ltd. L.p. transmission line materials. (See this issue.)

London.—CENTRAL ELECTRICITY BOARD.—January 4th, 1929. 132,000-V transformers in connection with the South-East England Electricity Scheme, 1927. (November 2nd.)

November 30th. 33,000-V transformers. (November 9th.)

WOOLWICH.—November 19th. Board of Guardians. Electric cooking apparatus. (November 9th.)

METROPOLITAN ASYLUMS BOARD.—November 28th. Installation of electric lighting at St. Anne's Home, Herne Bay. (See this issue.)

Lourenco Marques.—November 24th. Posts and Telegraphs Department. Materials, including g.i., copper and bronze wire, insulators, galvanometers, telephones, batteries, &c. (C. 2904.)*

New Zealand. — Wellington. — February 12th. Public Works Department. 110-kV switchgear and controlling equipment for Waitaki electric power scheme. (B.X. 4848.)*
January 15th, 1929. Posts and Telegraph Department. Telephone cords. (B.X. 4847.)*

Perth.—November 24th. Education Authority. Electric lighting and heating installation for the new academy. Mr. A. Watt Allison, master of works, Education Offices, Perth.

Preston. — December 12th. Electricity Committee. 60,000 tons of fuel for Ribble power station, Penwortham, during 12 months ending December 31st, 1929. Specification from Mr. J. F. Simpson, borough electrical engineer.

South Africa.—Johannesburg.—December 13th. Department of Posts and Telegraphs. Solder, copper wire and cable. (B.X. 4799.)*
Town Council. December 20th. Electrical equipment for tramcars and supply of tram trucks. (A.X. 7113.)*
December 20th. Telegraph materials. (C. 2900.)*
South African Railways and Harbours. December 13th. One 7-ton electrical overhead travelling crane. (A.X. 6989.)* One electrically-driven geared maximum service double planing machine. (A.X. 7064.)*
December 6th. Five 4-wheeled electrically driven traversers and one 5-ton hand-operated overhead travelling crane. (A.X. 7023.)* One 5-ton Diesel-electric caterpillar crane. (A.X. 7015.)*

Stoke-on-Trent.—December 5th. Electricity Department. One natural draught cooling tower. (November 2nd.)

Swindon.—December 10th. Corporation. Street fire alarm call bell system. (See this issue.)

Turkey.—Angora.—December 18th. Post, Telegraphs and Telephones Department. 50,000 metres of rubber-covered field-telephone wire. (B.X. 4849.)*

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed.

Chesterfield.—Tramways Committee. Accepted :—
Overhead equipment for railless vehicle service to New Whittington (£5,042).—British Insulated Cables, Ltd.

Dewsbury.—Board of Guardians. Accepted:—
Electrical work at new casual wards at the Staincliffe institution.—Mr. C. Roberts.

Egypt.—Egyptian State Railways.—The undermentioned tenders were received by the Egyptian State Railways, Telegraphs and Telephones for the supply of armoured and unarmoured, lead-covered, underground telephone cable :—

British Insulated Cables, Ltd.	£16,045
Kabelwerk Rheydt A.G.	18,655
Kabelwerk Duisburg A.G.	21,366
Felten & Guilleaume	14,162
Kachtal, Hackethal, Hanover	14,393
W. T. Glover & Co., Ltd.	17,610
Standard Telephones & Cables, Ltd.	17,188
Sud Kabelwerk	15,422
Dr. Cassirer	16,096
Kabelwerk Vieniz	17,265
Enfield Cable Works	17,629
Kabelwerke, Nuremburg	18 461
A.E.G.	15,973
Siemens and Halske A.G.	18,094
Do.	15,988
W. T. Henley's Telegraph Works Co., Ltd. ...	17,695
Do. ...	18,281
Do. ...	18,454

—*Reuter's Trade Service* (Cairo).

Glasgow.—Corporation. Accepted :—
Electrical equipments for 300 tramcars.—Metropolitan-Vickers Electrical Co., Ltd.

Hertford.—Town Council. Accepted :—
One 48-h.p. motor and starting gear for Port Hill waterworks (£355).—North Metropolitan Electric Power Supply Co., Ltd.

Hull.—Telephones Committee. Recommended :—
Automatic telephone bell sets (£379).—Automatic Telephone Manufacturing Co., Ltd.
Cable (£351).—Power & Lighting Cables, Ltd.
Tramways Committee. Accepted :—
One mile of trolley wire (£105).—Richard Johnson and Nephew, Ltd.

Leeds.—Electricity Committee. Accepted :—
Sub-station switchgear (£174).—H. J. Fuller & Sons.
Switchgear (£298), four sub-station kiosks (£609).—Yorkshire Switchgear & Engineering Co., Ltd.
Cables.—(£865), W. T. Henley's Telegraph Works Co., Ltd.; (£1,395), Enfield Cable Works, Ltd.; (£1,260), Macintosh Cable Co., Ltd.; and (£1,582), Greenwich Cable Works, Ltd.

London.—Metropolitan Asylums Board.
Installation of automatic telephone system at High Wood Hospital:—

Alpha Manufacturing & Electrical Co., Ltd. (Recommended)	£899
Clarke, T., & Co., Ltd.	1,100
Tate, L. G., & Co., Ltd.	1,119
Middleton, V. G., & Co., Ltd.	1,222
Electrical Contracts & Maintenance Co., (1925), Ltd.	1,290
Smethurst & Co. (London), Ltd.	1,300
Ericsson Telephones, Ltd.	1,398
Automatic Telephone Manufacturing Co., Ltd.	1,617

General Post Office.
Porous cells.—Edison Swan Electric Co., Ltd.

Manchester.—Health Committee. Accepted:—
Renewal of electric lighting cables at Baguley Sanatorium George Hill & Co., Ltd.

Oldham.—Electricity Committee. Accepted :—
Meter boards.—Samuel Ashton & Sons, Ltd.

Sheffield.—Markets Committee. Accepted :—
Electric wiring and fittings for new abattoir (£2,895).—Corporation Electricity Department.
The Committee rejected a proposal to accept the tender of a private firm which was £49 lower.
Wiring for power, circuits, motors, &c., at abattoir (£1,929).—G. E. Taylor & Co., Ltd.
Health Committee. Accepted :—
Maintenance of internal telephone and bell system for 12 months at various hospitals.—T. A. Ashton, Ltd.

Stretford.—Electricity Committee. Accepted :—
Transmission lines from Barton power station to Trafford power station.—W. T. Glover & Co., Ltd.

Twickenham.—Town Council. Accepted:—
Eight fire-alarm posts (£160).—Walters Electrical Manufacturing Co., Ltd.

York.—Electricity Committee. Accepted :—
Switchgear for Poppleton Road sub-station (£1,155).—A. Reyrolle & Co., Ltd.

Forthcoming Events.

Junior Institution of Engineers.—Friday, November 16th. 39, Victoria Street, S.W. 7.30 p.m. "Some Applications of Time and Remote Control Switches." Mr. A. H. Croucher.
Friday, November 23rd. "A Survey of Cadmium." Mr. C. F. Moore.

Institution of Mechanical Engineers.—Friday, November 16th. Institution, Storey's Gate, S.W. 6 p.m. "Power Transmission by Belts: An Investigation of Fundamentals." Mr. H. W. Swift.

British Electrical Development Association.—Friday, November 16th. Royal Society of Arts, John Street, Adelphi, W.C. 7.30 p.m. "Modern Lighting Designs for Domestic and Business Interiors." Mr. H. T. Young.

Association of Mining Electrical Engineers (Western Sub-Branch).—Saturday, November 17th. Wind Street, Swansea. "Cable Layout." Mr. J. A. B. Horseley, H.M. Electrical Inspector of Mines.

Electrical Power Engineers' Association (Kent Section).—Saturday, November 17th. Royal Star Hotel, Maidstone. 5.30 for 6 p.m. Annual dinner.

Royal Society of Arts.—Monday, November 19th. John Street, Adelphi, W.C. 8 p.m. Cantor Lecture. "Refrigeration." Dr. F. Kidd. (Lecture II.)

Batti-Wallahs' Society. — Wednesday, November 21st. Hotel Cecil, Strand, W.C. 1 p.m. Luncheon. Speaker: Rt. Hon. Sir Hamar Greenwood, Bt., M.P.

Institute of Fuel.—November 21st and 22nd. Institution of Electrical Engineers, Victoria Embankment, W.C.2. Autumn meeting, Wednesday, November 21st, at the Connaught Rooms, at 7.15 p.m., annual dinner and dance.

South Wales Institute of Engineers.—November 21st to December 1st. At Cardiff. Annual Engineering Exhibition.

Electroplaters' and Depositors' Technical Society.—Wednesday, November 21st. Northampton Polytechnic Institute, St. John Street, E.C. 8.15 p.m. Address by the president, Mr. S. Field.

Institution of Electrical Engineers.—Thursday, November 22nd. Institution, Savoy Place, W.C. 6 p.m. Joint meeting with the British Institute of Radiology. "The Electrical Equipment of X-Ray Apparatus." Mr. L. G. H. Sarsfield.

(Mersey and North Wales (Liverpool) Centre).—Monday, November 19th. University, Liverpool. 7 p.m. "Combustion." Prof. G. E. Scholes.

(North-Western Centre).—Friday, November 23rd. Engineers' Club, Manchester. 7.15 p.m. Joint meeting with the Manchester Association of Engineers. "Electric Traction on Railways." Mr. R. Brooks.

(North-Eastern Students' Section).—Friday, November 23rd. Grand Assembly Rooms, Barras Bridge. 8 p.m. Annual dance.

(North-Western Students' Section). — Tuesday, November 20th. Engineers' Club, Manchester. 7.15 p.m. Smoking concert.

(Sheffield Sub-Centre). — Wednesday, November 21st. Royal Victoria Hotel. 7.30 p.m. "Electric Tramways *v.* Motor-'Buses." Mr. W. D. Shears.

London Students' Section.—Friday, November 23rd. Institution, Savoy Place, W.C. 6.15 p.m. "Searchlights and their Applications." Lt.-Col. C. H. Sylvester Evans.

Birmingham Electric Club.—Friday, November 23rd. Grand Hotel. 7 p.m. "Some Aspects of Long-Distance Cable Telephony." Mr. P. E. Erikson.

Physical Society.—Friday, November 23rd. Imperial College of Science, South Kensington, S.W. 5 p.m. Ordinary meeting.

The "Electrical Review" Service Department.

INQUIRIES must be accompanied by a stamped addressed envelope.

We should be glad to learn the names and addresses of makers of the following:—

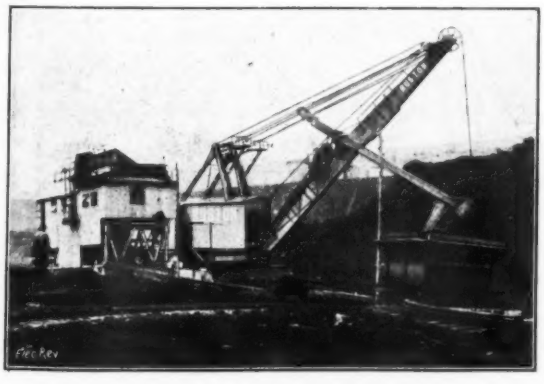
ASTROL hair dryers.

Luminous bricks for shop-window advertising having lettering on one, two, or three sides.

Notes.

British Excavating Plant.

A recent article in the *Daily Express* headed "Singapore Contract Sensation" caused Messrs. Ruston & Hornsby, Ltd., who are naturally anxious to uphold the prestige of British industry, to take steps to refute the suggestion that British excavator builders cannot supply machines such as are needed for excavation on the Singapore naval base contract. They



Ruston Elcctric Shovel at Yallourn, Australia.

accordingly arranged to run on the test grounds at their excavator works, Lincoln, two very large excavators on caterpillar tracks, which have been just completed for an important project overseas, and fall within the range of machines under review, to demonstrate their capabilities. We are informed that the British Government, by omitting to specify British materials when available, has permitted the contractors for the construction of the Singapore naval base to place with an American firm an order for four electrically-operated excavators to the value of £70,000.

The machines demonstrated at Lincoln by Messrs. Ruston and Hornsby were as large as those required for Singapore. It will be recalled that similar electrically-operated machines were inspected by the Prince of Wales last year before their dispatch for work on irrigation contracts in India, where drag-line excavators over 300 tons in weight have been working for years. Similar giant machines, working as shovels and equipped for electrical operation, are in use in Australia and in this country. A machine made in 1924, at that time probably the largest electrical excavator in the world, weighing 418 tons, with a bucket capacity of 10 cubic yards upon a jib 90 ft. long, was sent to Australia for excavating brown coal at Yallourn, and the accompanying illustration shows a 350-ton electric shovel which has been operating there for four years.

On November 9th the *Daily Mail* announced that an order had been placed with Messrs. Ruston & Hornsby, Ltd., for two excavators and another with Messrs. Ransomes & Rapier, Ltd., for five excavators, in connection with the Singapore dock contract (secured by Sir John Jackson, Ltd.).

The Faraday Society.

To commemorate the 25th anniversary of the founding of the Faraday Society, a luncheon was held at Jules Restaurant, London, on November 9th, followed by the delivery by Sir Oliver Lodge at the Royal Institution of the first Spiers Memorial Lecture on "Some Debatable Problems in Physics." This lecture was delivered in accordance with the terms of a trust founded to keep alive the memory of the late Mr. F. S. Spiers, a founder of the Society and its secretary and editor until his death in May, 1926.

Prof. T. M. Lowry, F.R.S. (president) was in the chair at the luncheon, which was attended by distinguished representatives of scientific societies from many parts of the world.

Prof. E. C. S. Bijlman (Union Internationale de la Chimie Pure et Appliquée), proposing the toast of "The Faraday Society," spoke highly of the work it had done during its 25 years' existence, and said that scientists abroad wished it all possible further success. He particularly stressed the value of the general discussions that had been a feature of the work of the Society, and, speaking of the work of Oersted—his countryman—on the one hand, and Michael Faraday on the other, handed to the president of the Faraday Society a copy of two volumes of correspondence between Oersted and the scientific societies and Faraday.

Mr. James Swinburne responded to the toast in a characteristically humorous speech, and added that a great deal of the success of the Society had been due to the late Mr. Spiers, who had shown a special aptitude for organising discussions. He contrasted the average discussion before a technical society with the very comprehensive discussions which the Faraday Society held, the latter being discussions by experts in the particular subject, whereas it was too often the case in an ordinary discussion that speakers would say they had not had time to read the paper, and frequently were not able to add any information of value.

The President, acknowledging the toast, said that as long ago as 1923, when he had the pleasure of inviting the Faraday Society to Cambridge, the fiftieth general discussion was celebrated; but the success of the general discussions was largely due to the willingness with which distinguished scientists in other countries came here and took part in them. He expressed the hope that the international spirit would be fostered and developed, and that there would be before long international general discussions, although they could not be very different from those that had been held by the Faraday Society in the past, owing to the assistance of scientists in other countries. There could, however, be international general discussions in the various countries.

Prof. F. G. Donnan proposed "The Guests," and Prof. K. Fajans and Senator Marconi replied.

Batti-Wallahs' Society.

This Society will hold its next luncheon at the Hotel Cecil, Strand, W.C., on Wednesday, November 21st, at one o'clock. The speaker will be the Rt. Hon. Sir Hamar Greenwood, Bart., M.P.

Progress in Illuminating Engineering.

The opening meeting of the Illuminating Engineering Society, held at the E.L.M.A. Lighting Service Bureau on November 6th, was, as usual, devoted to reports of progress and exhibits of novelties. Mr. C. C. Paterson, the new president, occupied the chair, and Mr. J. S. Dow presented a brief report of progress during the vacation, drawing attention to the growth of interest in illuminating engineering all over the world.

Mr. C. C. Paterson, who followed, gave an account of the International Illumination Congress in the United States, and described the wonderful hospitality which had been shown to delegates. He referred to the proposal that the next session of the International Commission on Illumination should be held in England in 1931.

The Report of the Committee on Progress in Electric Lamps and Lighting Appliances was presented by Mr. J. W. Elliott. Attention was drawn to the fact that many undertakings were making substantial reductions in their charges for electricity, and that the prices of lamps had also been considerably reduced; prices of vacuum and gasfilled lamps were, respectively, 38 and 60 per cent. less than in 1918.

Following the reading of the initial reports, there was a representative display of lamps and apparatus illustrating progress in illuminating engineering. Mr. A. W. Beuttell exhibited some ingenious forms of electric signs in which effective use is made of the reflection of light from the curved glass cover. Mr. A. Cunnington (Southern Railway) described a new method of assembling acetylene flares for night construction work, &c. Mr. L. E. Buckell (General Electric Co., Ltd.) exhibited the 10-kW gasfilled lamp developed for the floodlighting of aerodromes and other special purposes. Mr. Tingley showed in operation the new "Dia" long-burning

flame arc lamp, taking 30 amperes, similar to those recently installed by Messrs. Korting & Mathiesen in Leipsic and elsewhere—doubtless one of the most powerful street lighting units existing at the present time.

New types of illumination photometers were shown by Mr. Russ (Philips foot-candle meter), Mr. Herbert (Benjamin "Lightometer"), and Mr. Stroud, who demonstrated the latest and greatly improved "Holophane Lumeter," and also the new "Holophane" prismatic panels, an interesting development with considerable possibilities.

Other exhibits included some pleasing forms of lighting units shown by Mr. Calvert (Siemens Electric Lamps & Supplies, Ltd.), by Messrs. A. W. Zelley and Blake (L. G. Hawkins, Ltd.), and by Mr. C. T. Payn, whose exhibit comprised some of the "Treph" lighting units which utilise a series of concentric shells to give very soft diffusing effects. New types of spot lights and floodlighting units were shown by the General Electric Co., Ltd., Messrs. Metro-Vick Supplies, Ltd., and the Strand Electric & Engineering Co., Ltd.

The next meeting will be held at the E.L.M.A. Lighting Service Bureau on December 11th, when a paper, entitled "The Use of Electricity: Electric Light for Advertising Purposes," will be read by Mr. H. Lingard.

Appointments Vacant.

General manager and engineer (£1,000) for the Norwich Electric Tramways Co. Teacher and assistant teacher in electrical technology and mathematics for the L.C.C. Hackney Technical Institute. Meter tester and reader for the Holmfirth U.D.C. Electricity Department. General clerk (£160) for the Buxton Corporation Electricity Department. Two technical assistants (£227) for the Chief Superintendent of Ordnance Factories, Royal Arsenal, Woolwich. Assistant electrical engineer (£480), for the Government of Nigeria Railway Department. Two junior charge engineers for the Borough of Barrow-in-Furness Electricity Department. Switchboard attendant for the Tunbridge Corporation Electricity Department. One assistant maintenance engineer, one traffic engineer, and three installing engineers for the Shanghai Mutual Telephone Co., Ltd. Men for S. Africa for laying and jointing e.h.p. cables. (See our advertisement pages to-day.

Dutch Television.

Mr. J. M. Baird is reported to have reached an agreement with the Dutch wireless authorities to transmit television images from their station at Scheveningen. A State transmitter has been placed at the disposal of the Dutch company holding the rights of the Baird apparatus. Transmission will be on a wave-length of 1,470 metres.

Electricity Supply Rifle League.

The results of the matches shot during October in connection with the above-named League are set out below:—

Division 1.

City A (Jackson, McNeil, Smith 98), 581; Central A (Wright 99), 579.

Central A (Pearce 99), 580; B. & K. (Jocelyn 99), 577.

Scores:

	Shot.	Won.	Lost.	For.	Against.	Pts.
Central A	6	4	2	3,461	3,448	8
B. & K.	5	3	2	2,891	2,862	6
City A	5	3	2	2,885	2,866	6
Shoreditch A ...	4	2	2	2,310	2,282	4
County A	4	0	4	2,240	2,329	0

Division 2.

City B (Hadden 99), 574; K. & K. (Jennings 96), 550.

City B (Colin 97), 570; County B (Hurst, Reggler 97), 566.

St. James' (Andrews 98), 579; Central B (Lee 96), 571.

Central B (Watkins, Owen 95), 558; County B (Coveney, Reggler 94), 555.

County B (Coveney 96), 550; Hackney (Wilkinson 92), 496.

Scores:

	Shot.	Won.	Lost.	Drawn.	For.	Against.	Pts.
City B ...	8	7	1	0	2,569	4,376	14
St. James' ...	7	5	2	0	3,903	3,829	10
Central B ...	8	4	3	1	4,481	4,411	9
County B ...	7	3	3	1	3,914	3,844	7
Shoreditch B	6	3	3	0	3,285	3,270	6
K. & K. ...	6	1	5	0	3,199	3,270	2
Hackney ...	6	0	6	0	2,941	3,292	0

It is unfortunate that some of the clubs are suffering from lack of range accommodation, and so experiencing difficulty in meeting their engagements, but it is a healthy sign that all the available space is being commandeered for plant extensions in connection with the various supply undertakings, and riflemen, if keen, will eventually, we hope, find some place to rest their elbows whilst scoring "possibles."

Local Societies.

"Electricity and Public Health" was the subject of an address by Mr. G. S. Francis, of the British Electrical Development Association, London, to the members of the Plymouth Rotary Club on Friday, November 2nd. He said three million tons of unconsumed matter was poured into our atmosphere every year from factory and domestic chimneys; the smoke pall that hung over our towns and industrial areas polluted the air and formed an effective barrier to the free passage of the actinic, or health-giving ultra-violet, rays of the sun. Until the air could be cleaned by the increasing use of electricity in place of crude fuel, the deficiency could be made good by electrically-induced ultra-violet rays.

Lecturing at the Public Library at Plymouth on Saturday, November 3rd, on "A Century of Transport," Mr. Francis dealt with the transport transformation which was going on at the present time, as compared with a hundred years ago. The electric method was the most efficient, and facilitated a more frequent and rapid service.

Members of the Paisley Association of Electrical Engineers recently paid a visit to the Glasgow Corporation Refuse Power Works.

Members of the West Midland Institution of Municipal and County Surveyors inspected the Hams Hall power station, Birmingham, on November 2nd.

British Cast-Iron Research Association.

The seventh annual report of the above Association (president, Maj.-Gen. Sir Philip Nash, K.C.M.G.) for the year ended June 30th, 1928, shows an excess of expenditure over income for the year of £140; but this amount represents part of the remainder of the allotted sum of £1,200 authorised two years ago for new premises and equipment. The Association's assets now stand in the books at £480. The expenditure for accommodation for the year was £596, as against £816 for the year ended June, 1926, showing the resulting economy from the combination of offices and laboratory in the new premises. The subscribing membership of the Association in all classes at the end of the year was 298. During the year the director of the Association, Mr. J. G. Pearce, M.Sc., was given the first award in a competition organised by the Glasgow and West of Scotland Institute of Foremen Engineers and Draughtsmen for the most practicable and directly applicable series of proposals for promoting goodwill in industry.

Neon Indicators.

The lamp illustrated on page 824 of our last issue, taking half a watt (obviously, not ½ kW!), can only be supplied with s.e.s. and s.b.c. caps, not b.c. as stated.

Extensions at Nottingham.

On Wednesday last week Sir Andrew Duncan, chairman of the Central Electricity Board, officially inaugurated extensions which have recently been completed at the North Wilford power station of the Nottingham Corporation. The extensions, which bring the total plant capacity of the station up to 57,500 kW, include a 20,000-kW turbo-alternator set by the British Thomson-Houston Co., Ltd., and two 55,000-lb. boilers by the Stirling Boiler Co., Ltd. After the ceremony those present were entertained at luncheon at the Mechanics' Institution, under the presidency of the Lord Mayor of Nottingham, Alderman E. Huntsman, who presented to Sir Andrew Duncan a silver cigar box in commemoration of his visit. In response to the toast of his health, proposed by the Lord Mayor, Sir Andrew said that when the scheme was being promoted for the Central England area, from no one did they receive greater consideration and help than from the Lord Mayor. The North Wilford power station had been embarked upon with a much larger object in mind than that of merely meeting local needs. In many places, but not in Nottingham, those connected with the Board had been received with some little doubt, it being feared, apparently, that the Board's operations might ultimately put an end to their generating stations. He never objected to a man fighting for his own corner; all he asked was that, in doing so, common-sense should be exercised to ensure that the larger view should not be lost in the local one. The Board had only been in existence for 18 months, but during that time it had promoted and adopted four area schemes. Important contracts had been placed for the Scottish and South of England schemes, and the Board had undertaken obligations to the extent of a little over three million pounds. Mr. A. Page, their chief engineer, was now busily engaged on preliminary arrangements for specifications for Central England. Such progress had only been rendered possible by co-operation with corporations and companies concerned in supplying the different areas; a general spirit of helpfulness had prevailed with regard to the Board's work. He hoped that the Board would be regarded as an instrument to be used by those concerned in the industry, so that the generation of electricity might be extended for the benefit of the community generally. He was glad to find that the Nottingham Committee contemplated extensions of supply in the interests of consumers. The Central Board was under no illusions; it recognised that whatever economies might be effected in the generation and distribution of electricity, they would only accrue if there was the determination upon the part of the responsible authorities to extend supplies, both for industrial and household purposes. If any advantages were secured thereby, they would be obtained by the undertakings themselves, and not by the Board.

Councillor W. Halls, vice-chairman of the Committee, proposed "The Engineers," and Mr. J. H. Rider, consulting engineer, whose name was coupled with the toast, in responding, gave some interesting figures relative to the North Wilford station, and especially as to the economies which had been effected there. The success of the station, he said, depended on a large demand and a higher load factor. That could be obtained by a greater use of electricity by the people of Nottingham for domestic purposes, apart from lighting, and by the

operations of the Central Electricity Board. He felt that North Wilford would take its right place in the national scheme, and assured the Nottingham people that there was no fear for the future of the station. He would go as far as to say that of all the investments which the Nottingham Corporation had made, the North Wilford station was going to prove the best. In paying a high tribute to the work of the staff, Mr. Rider referred especially to Mr. Talbot, city electrical engineer, Mr. Haydon, resident engineer, Mr. Jockel and Mr. Brown.

The Lord Mayor of Leicester, and Mr. J. P. Gregory, of the British Thomson-Houston Co., responded on behalf of "The Visitors," the toast being submitted by the Sheriff.

Fatalities.

An inquest was held on November 7th at Willington-on-Tyne on the body of Robert Taylor, an apprentice plater, who received a fatal electric shock whilst walking along a path near the L. & N.E.R. station at Howdon. It was stated that deceased put his hand through the railings and grasped some tubing. Thomas Gray, an electrical engineer in the employ of the L.N.E.R., described the path and the electrical fittings for the lamps. He said he examined the place and found part of the wire was touching a metal shade, making the whole part "alive." The voltage was 250. To get hold of the tubing the boy would have to deliberately put his hand through the railings. Returning a verdict of "Accidental death," the coroner said he thought the most serious thing about the case was that someone had been wilfully damaging the lamps, and this was the cause of the short circuit.

An inquiry was held at the Sheriff Court, Dundee, on November 5th, into the circumstances attending the death of Robert Kay Milne, a fitter's mate employed by the Dundee Electricity Department. Evidence was given that the deceased was "lent" to the British Thomson-Houston Co., Ltd., for work in the switchrooms at the Carolina Port generating station. Mr. D. H. Bishop, the engineer and general manager, said that Milne was at work in a portion of a cell in which there was no danger, but he was found dead with his feet through an opening in a ledge on which he was working, having made contact with a conductor charged at 3,650 volts. The witness did not consider it possible that Milne could have slipped and thought that he put his feet down absentmindedly. Corroborative evidence was given, one witness stating that the men had been warned repeatedly that the 'busbars concerned were "live."

The jury returned a verdict to the effect that for some reason not explained by the evidence deceased's feet got down through an opening on the inside of the ledge where he was working and came into contact with a live conductor.

Electrically-driven Ships.

The 60,000-ton liner which is to be built at Belfast for the White Star Co., is to be driven by electricity, according to a statement made by Lord Kylsant, chairman of the company, on his recent return from New York. The new ship will be the largest in the world, 1,000 ft. long between perpendiculars, and her speed will be comparable with that of the new North German Lloyd Co.'s twins *Bremen* and *Europa*, which is nominally 26.5 knots, but is expected to reach 27 knots at sea. The largest vessels so far turbo-electrically driven are the U.S.A. naval aircraft carriers *Lexington* and *Saratoga*, displacing 33,000 tons each, with machinery developing 180,000 h.p. and a designed speed of 34.5 knots. The largest merchant ship to be equipped for electric propulsion is the P. & O. Co.'s mail steamer *Viceroy of India*, which was launched on the River Clyde in September last; her gross tonnage will be 19,000, and her speed 19 knots. Twin motors of 18,000 h.p. will be driven by turbo-generators operating at high steam pressure produced by oil-fired boilers. The keel plates of a "super-Olympic" were laid at the Queen's Island yard of Messrs. Harland & Wolff, Belfast, this summer. She will be an electric ship and is expected to be ready for transatlantic service in 1931.

Junior Institution of Engineers.

At the annual general meeting of the Institution, held on November 9th, Mr. S. H. Hole, A.M.I.A.E., was elected chairman of the Institution; Messrs. S. Dunlop and E. D. Gill vice-chairmen; Messrs. R. H. Allen, B.Sc.(Eng.), Mr. F. C. Moore, Mr. G. A. Ogden, and Mr. E. T. Agutter, councillors; and Mr. W. M. Hurrell, treasurer. The first meeting of the session will be held at the Royal Society of Arts, on Friday, December 7th, when the medals and awards will be distributed by the retiring President, Sir Murdoch MacDonald, K.C.M.G., who will also induct as his successor Lt.-Col. J. T. C. Moore-Brabazon, M.C., M.P., and the latter will deliver his address, entitled "The Future of Coal in Relation to Industry."

Our Personal Column.

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements.

The following appointments in connection with the Potteries Electric Traction Co. have been made: Mr. O. C. POWER, to be managing director; Mr. W. THOM, to be a director (he has resigned the position of general manager); Mr. H. KINGSBURY becomes a director and secretary; Mr. J. LINDSAY WOOD is appointed traffic manager; and Mr. A. C. DIMMACK, engineer.

Mr. FREDERICK O'FLYNN, who has been for several years assistant electrical engineer under the Limerick Corporation, has now been transferred by the Electricity Supply Board from Limerick power station to Enniscorthy, County Wexford, and has been placed in charge of that station and district.

Dr. T. A. WATSON, of the U.S.A., who was associated with Bell in his early telephony experiments and actually made the first telephone instrument, was present at the November 8th meeting of the Institution of Electrical Engineers. He gave a lecture before the Institution of Post Office Electrical Engineers at the I.E.E. building on November 13th, when the theatre was filled literally to the doors—a record attendance.

It is announced that Sir HENRY MAYBURY, whose resignation of the position of Director-General of the Roads Department of the Ministry of Transport, will act in an advisory capacity to the Ministry in connection with bridges, roads, and traffic, and that he will have an office at Westminster where he will practise as a consulting engineer.

Mr. ERNEST E. SHARP, of Venner Time Switches, Ltd., is leaving England early in December for a tour among overseas agents and friends. He will go *via* Panama and return *via* Suez. His itinerary will embrace New Zealand, Australia and Tasmania.

Mr. THOS. L. MILLER, of Liverpool, will be retiring from active practice as a consulting engineer at the end of the year. Some of our readers will remember that he has so practised at Liverpool since 1890. He will continue to act on the panel of referees appointed by the Lord Chief Justice under the Rating and Valuation Act of 1925.

Mr. W. S. TINSLEY, retiring from the position of chief engineer for the Bradford G.P.O. Telephone District, after 46 years' service in the department, was on November 9th presented with a silver tea service and cabinet gramophone, at a gathering of over 90 of his colleagues on the engineering staff.

Captain JAMES E. FLETCHER, who has just taken over duty as sectional engineer of the Bradford and District Telephone District, in succession to Mr. W. S. Tinsley, has spent his life in the Government telegraph and telephone engineering service. After periods at Newcastle-on-Tyne and Darlington, he was transferred to London to take a part in the valuation of the old National Telephone Company's plant, and later went to York. After the war he transferred to Leeds, where he was closely identified with extensive telephone developments. For two years past he has been chief engineer on the technical staff for South Lancashire, at Manchester.

Mr. ROBERT NASH, of the staff at the Aylesbury Corporation electricity works, has been presented by his colleagues with an oak chair on leaving to take up another appointment.

The Council of the Royal Society recommends that Sir ERNEST RUTHERFORD shall be president for the ensuing year.

Mr. A. PEMBERTON, for nine years works manager for Mirrlees, Bickerton & Day, Ltd., of Stockport, who is retiring through ill-health, has been presented with a solid silver épergne by the staff and employés.

Mr. GISLI J. OLAFSON has recently been appointed director-general of the Iceland Telegraphs in succession to the late Mr. Olaf Forberg.

The Royal Society announces the award of one of the Royal Medals to Prof. A. S. EDDINGTON; the Copley Medal to Sir CHARLES A. PARSONS; and the Hughes Medal to M. LE DUC DE BROGLIE.

The Tonbridge Urban Council has appointed Mr. F. YOUNG, of Rainham, as installation engineer. There were 70 applicants for the post.

Messrs. George Green & Company, of West Norwood, inform us that Mr. L. A. BOOTH has relinquished his connection with the firm.

Mr. B. FOREMAN, of the Boston Corporation Electricity Works, has been appointed station superintendent at the Nuneaton Corporation Electricity Works.

Mr. JOHN EDOM, the oldest member of the staff of the Birkenhead Corporation Tramways, has retired from the position of traffic inspector. In 1917, when he completed 50 years' service with the tramway and omnibus undertakings, the Tramways Committee made him a presentation.

We reproduce herewith a portrait of Mr. Donald Smeaton Munro, who is chairman of the Scottish Centre of the Institution of Electrical Engineers. Mr. Munro was born in Glasgow in 1879, his father being Mr. J. M. M. Munro, F.R.S.E., M.I.E.E., a pioneer of electrical work in Scotland. He was educated at private schools, the Glasgow High School, the Glasgow and West of Scotland Technical College, and at the University of Glasgow. A seven years' apprenticeship to electrical engineering was served with the firm of Anderson and Munro (founded by his grandfather), and the Mirrlees, Watson and Yaryan Co. For some time he acted as assistant to his father in connection with important consulting work for British and foreign water-power schemes and for town and private lighting undertakings. In 1912 Mr. Munro took over, under his own name, the Edinburgh branch of the business founded by his grandfather, which has since been chiefly devoted to installation work. Mr. Munro has obtained patents for many inventions of an electrical nature, and from the successful sale of a patent obtained at an early age he was enabled to take the first of several tours of inspection of Continental works. He is the author of many papers and articles on engineering subjects, and his book on "The Practice of Electrical Wiring" is in constant demand. Mr. Munro is editor of the electrical section of the *Edinburgh Journal*, and his recent paper on "Electric Wiring" was read and discussed at eleven centres and sub-centres of the Institution. In 1918 he was elected Edinburgh representative on the central board of the Electrical Contractors' Association of Scotland, and has been re-elected continuously until his resignation this year. He was the originator and first editor of the "E.C.A. of S. Year Book," now in its sixth year of issue. Mr. Munro held office as vice-president for two years, and was president of the Association in the years 1922-23. In 1923 he was elected to the Board of the National Register of Electrical Installation Contractors, and has served as the Scottish representative on the London executive of that body since its formation. He was one of the founder members of the Edinburgh Electrical Society, the chair of which he has occupied, and he has served as vice-chairman of the Lothian branch of the Association of Mining Engineers. He is a Fellow of the Royal Scottish Society of Arts, and a member of the Cockburn Association and other bodies with scientific and art interests. It is of interest to recall that Mr. Munro's father was one of the original members of the Scottish Section, and was chairman in 1905.

Elliott & Fry] *[London.*

Mr. D. S. Munro,

Chairman of the Scottish Centre of the I.E.E.

This session's chairman of the North-Western Centre of the Institution of Electrical Engineers is Mr. J. Harcourt Williams, whose portrait appears herewith. Mr. Williams was educated at Charterhouse and at the Central Technical College, South Kensington, of which he holds the diploma. He served an apprenticeship with Messrs. Maudslay, Son & Field, and joined the British Thomson-Houston Co., Ltd., in 1900. His first work with the company was in connection with the Sheffield contract, and he remained on the construction staff until 1912, the last seven years being spent in the London area. During this period he was connected with the electrification of the Tynemouth branch of the North-Eastern Railway, the Brighton Railway, and contracts for London municipalities and power companies. In 1912 he went to the company's London office, where he remained until 1920, when he was appointed manager of the Manchester branch, a position which he still occupies. Mr. Williams is a member of the Institution of Civil Engineers and the American Institute of Electrical Engineers.

Mr. J. Harcourt Williams,

Chairman of the North-Western Centre of the I.E.E.

Obituary.—Mr. C. J. Jewell.—Mr. Charles J. Jewell, M.I.E.E., to whose death we referred briefly in our last issue, was for the last eight years of his life general manager of the Norwich Electric Tramways. His death occurred at his residence, 21, Unthank Road, Norwich, on November 2nd, at the age of 56 years. Mr. Jewell's association with the electrical world was a long and varied one. He began his studies at Finsbury Technical College under the late Professor Silvanus Thompson, and served an apprenticeship at the Midland Railway Works, Derby. Three years on the electrical experimental staff of that company followed, after which he was for two years junior assistant to Mr. T. W. G. Aldridge, consulting engineer to the London and South-Western Railway. For eight years he was engineer in the Contracts Department of Messrs. W. T. Glover & Co. at Trafford Park, and 21 years were spent in the tramway world, 13 years as resident engineer to the Yorkshire (West Riding) Electric Tramways and eight years as general manager to the Norwich Electric Tramways. In the year 1920 Mr. Jewell was chairman of the North Midland Section of the Institution of Electrical Engineers. He was a past vice-president of the Norwich Engineering Society and president-designate for the same society for the year 1929; a member of the Council of the Tramways and Light Railways Association; a member of the Executive Committee of the Conference of Tramway and Light Railway Companies; and one of the eight company representatives on the National Joint Industrial Council for the Tramway Industry. Mr. Jewell was a member of the Standing Joint Committee of the Municipal Tramways and Transport Association and Tramways and Light Railways Association on the Standardisation of Overhead Line Equipment.

Herr W. Winkler-Forazest. — The death recently occurred at Klagenfurt, Austria, at the age of 71 years, of Herr Ing. W. Winkler-Forazest. The deceased was a pioneer in electrical engineering work in Austria, having been associated with the construction of the first Edison and Gramme dynamos in that country. For many years he was the electrical engineer of the City of Klagenfurt.

Mr. C. G. Conradi.—The death occurred on October 30th, at the age of 50 years, of Mr. Charles G. Conradi, M.I.Mech.E., managing director of Electromobile, Ltd., of Otley, Leeds. Mr. Conradi was a member of the Electric Vehicle Committee.

Mr. A. Eadie.—The death occurred on November 11th at Glasgow, in his 75th year, of Mr. Andrew Eadie, J.P., chairman of the Scottish Tube Co., Ltd.

Financial Section.

New Companies, Returns of Share Capital, Debenture Changes, Reports of Electrical Companies, Dividend Results, Transactions in Stocks and Shares.

New Companies Registered.

Ever-Ready Trust and Finance Co., Ltd.—Public company. Registered November 9th. Capital, £1,000,000 in 900,000 ordinary shares of £1 each and 1,000 deferred shares of £100 each. The ordinary shares rank first for 7 per cent. dividend in each year, and take half of any surplus profits distributed. Objects: To acquire and hold shares, stocks, debentures and securities, to carry on business as financiers, promoters, agents, guarantors, &c. Directors are: Magnus Goodfellow, Lyonsdown Road, New Barnet, Herts., chairman and managing director of Ever Ready Co. (Great Britain), Ltd.; W. R. Walker, Whyteleafe, Surrey, chairman of Anglo-Eastern Finance Corporation, Ltd.; A. H. Sheppard, Broad Walk, Winchmore Hill, N.21, director of Ever Ready Co.; C. H. Dade, Chislehurst Road, Bickley, Kent, director of Ever Ready Co.; W. T. Walker, "Lilleshall," Bishopswood Road, Highgate, N., chartered accountant. Registered office: Ever Ready Works, Hercules Place, N.7.

Garden Brothers, Ltd.—Private company. Registered in Edinburgh on November 9th. Capital, £1,200 in £1 shares. Objects: To carry on the business of electricians, mechanical engineers, sanitary engineers, &c. The directors are: W. C. Garden, 101, Marlborough Avenue, Broomhill, Glasgow, electrician; C. Garden, 79, Munro Road, Jordanhill, Glasgow, electrician; G. Grant, 24, Talisman Road, Knightswood, Glasgow, plumber. Secretary: A. Mitchell. Registered office: 43, Clarence Drive, Hyndland, Glasgow.

Southend Radio and Gramophone Co., Ltd.—Private company. Registered November 7th. Capital, £1,000 in £1 shares. Objects: To carry on the business of radio engineers, electricians, manufacturers of and dealers in gramophones, radio gramophones, electromagnetic recording and reproducing devices, &c. The directors are:—F. A. Mayer, radio engineer, and Elizabeth E. Mayer, "Stilemans," Wickford; Maude A. Parker, 21, Cheltenham Road, Southend-on-Sea; E. M. Eldred, 839, London Road, Westcliff-on-Sea; Miss Elsie Headley, Frances House, High Street, Rayleigh. Secretary: Elsie Headley. Registered office: Stilemans Works, Wickford.

James Ritchie & Sons, Ltd.—Private company. Registered November 3rd. Capital, £4,000 in £1 shares. Objects: To acquire the business of lift makers, cabinet makers and joiners, formerly carried on by J. J. W. and A. Ritchie as "James Ritchie & Sons," at 34-38, Surrey Lane, Battersea, S.W.; also to carry on the business of electrical engineers, metal and wood workers, &c. The subscribers (each with one share) are:—J. W. Ritchie, 36, Surrey Lane, S.W.11, and A. Ritchie, 25, Octavia Street, S.W.11, lift manufacturers. Registered office: 34, Surrey Lane, Battersea, S.W.11.

Continental and Overseas Wireless Pictures, Ltd.—Private company. Registered November 5th. Capital, £100 in £1 shares. Objects: To carry on business as indicated by the title. The subscribers (each with one share) are:—E. J. Burrows, 29, Lyndhurst Road, Highams Park, E.4, and T. G. Greenleaf, 36, Sistova Road, Balham, S.W.12, solicitor's clerks. Solicitors: Herbert Smith & Co., 62, London Wall, E.C.

Official Returns of Electrical Companies.

Peranne & Co., Ltd.—G. P. Taylor, of 5, John Street, Bedford Row, W.C.1, was appointed receiver and manager on October 26th, 1928, under powers contained in debenture dated October 3rd, 1924.

Para Electric Railways and Lighting Co., Ltd.—Capital, £780,000 in 390,000 preference and 390,000 ordinary shares of £1 each. Return dated April 30th, 1928. 325,000 preference and 390,000 ordinary shares taken up. £25,040 paid on 25,000 preference and 40 ordinary shares. £689,960 considered as paid on 300,000 preference and 389,960 ordinary shares. Mortgages and charges, £520,130.

Chadburn's (Ship) Telegraph Co., Ltd. — Capital, £120,000 in 60,000 preference and 60,000 ordinary shares of £1 each. Return dated July 13th, 1928. All shares taken up. £100,000 paid on 50,000 preference and 50,000 ordinary shares. £20,000 considered as paid on 10,000 preference and 10,000 ordinary shares. Mortgages and charges nil.

Macintosh Cable Co., Ltd.—Capital, £100,000 in 75,000 ordinary and 25,000 preference shares of £1 each. Return dated May 11th, 1928. 51,008 ordinary and 23,997 preference shares taken up. £13,004 paid on 13,004 ordinary shares. £62,001 considered as paid on 38,004 ordinary and 23,997 preference shares. Mortgages and charges nil.

W. Sisson & Co., Ltd.—Capital, £50,000 in 5,000 preference, 38,000 ordinary, and 7,000 deferred shares of £1 each. Return dated July 31st, 1928. 4,375 preference, 31,711 ordinary, and 7,000 deferred shares taken up. £28,686 paid on 4,375 preference and 24,311 ordinary shares. £14,400 considered as paid on the remainder. Mortgages and charges nil.

Gilwern Manufacturing Co., Ltd.—Satisfaction in full on October 14th, 1928, of debentures dated December 15th, 1927, and March 15th, 1928, securing the aggregate sum of £1,950.

Lithanode Co., Ltd.—Capital, £3,000 in £1 shares. Return dated July 25th, 1928. 2,202 shares taken up. £502 paid. £1,700 considered as paid. Mortgages and charges, £2,900.

Wallingford and District Electric Supply Co., Ltd.—Capital, £13,000 in £1 shares. Return dated June 13th, 1928. All shares taken up £13,000 paid. Mortgages and charges, £3,500.

Accumulators of Woking (1928), Ltd.—Particulars filed of £8,000 debentures authorised October 31st, 1928, charged on freehold land and buildings at Maybury, Woking, and the company's undertaking and property, present and future, including uncalled capital, the whole amount being now issued.

Dakol Electric, Ltd.—Particulars filed of £12,000 debentures authorised by resolutions of September 15th and October 2nd, 1928, charged on the company's undertaking and property, present and future, the amount of the present issue being £6,000.

Richmore Valve Co., Ltd.—Particulars filed of £700 debentures authorised October 18th, 1928, charged on the company's undertaking, property and assets, including uncalled capital, the whole amount being now issued.

Steyning Electric Light Co., Ltd.—Satisfaction in full of charge dated February 18th, 1921, securing all moneys due or to become due. (Notice filed November 2nd, 1928.)

City Notes.

The Metro-Vick and B.T.-H. Companies.

On November 9th a circular was officially issued to the shareholders of the Metropolitan-Vickers Electrical Co., Ltd., with reference to the fusion scheme of which we have made mention in our last two issues. The circular states that the company is to become a holding company, and the board has been reconstituted as follows:—Mr. H. C. Levis (chairman), Sir Philip A. M. Nash (managing director), Mr. Bernard D. F. Docker, Sir W. Guy Granet, Gen. Sir Herbert Lawrence, Sir E. Wyldbore Smith, Mr. O. H. Smith, Mr. V. H. Smith, Mr. C. F. Spencer, the Earl of Verulam, and Lord Wargrave. As the result of negotiations with the International General Electric Co., the company is acquiring the great majority of the issued ordinary shares of the British Thomson-Houston Co., Ltd., and of the Edison Swan Electric Co., Ltd., and practically the whole of the issued share capital of Ferguson,

Pailin, Ltd. The number of B.T.-H. shares acquired will be 1,920,000 out of an issue of 2,000,000. The consideration for these £1 shares will be £1,152,000 in ordinary shares of the holding company (*i.e.*, 12s. per share). Of 957,177 ordinary shares of 4s. each issued by the Edison Swan Co., the company will take over 887,214; and it will acquire from Ferguson, Pailin, Ltd., 59,637 7 per cent. participating £1 preference shares (out of 60,000 issued) and 89,730 £1 ordinary shares (out of 90,000). The purchase consideration for these Edison Swan and Ferguson, Pailin shares will be £969,186, payable in cash. The interests thus centred in the company will represent the largest combination of undertakings engaged in the manufacture of electrical plant and appliances of all types in Great Britain, with important works at Trafford Park, Openshaw, Sheffield, Rugby, Coventry, Birmingham, Chesterfield, Willesden, Lutterworth, Ponders End, and Brimsdown. In addition, the group will own a number of subsidiary companies trading in various parts of the world, and possess manufacturing facilities in Australia. The total number of employés in Great Britain, of all these companies at October 1st, 1928, was approximately 29,000. With the exception of the output of the Australian workshops, and of an insignificant number of specialised articles, for which demand in this country has not yet justified manufacture here, all the projects sold by this group are at present, and will continue to be, entirely manufactured in Great Britain. It is again emphasised that it is intended that the identities of the four companies shall be preserved, while actively co-operating under the general guidance of a central board. The combination of their activities in one group will enable economies to be gradually effected. In particular, there will be co-ordination in research. The consequent reduction of manufacturing costs will place the company in a better position to meet foreign competition both at home and abroad, thus enlarging its turnover and offering increased employment in its workshops. The directors express their thanks to Mr. F. Dudley Docker for his active co-operation and assistance in promoting the scheme, and state that the cash portion of the purchase consideration and additional working capital will be raised by an issue of 1,136,950 £1 ordinary shares of the company at 25s. each. These are offered to the present ordinary shareholders in the proportion of one new share for each share held. The offer remains open until December 3rd, and application for permission to deal in the provisional letters and the new shares has been made to the Stock Exchange Committee. The combined profits of the four companies during the past four years have been as follows:—1924, £648,124; 1925, £495,486; 1926, £409,474; and 1927, £500,650. The average for the four years is £513,433, and deducting therefrom the proportion attributable to the 8 per cent. cumulative preference shares of the company and to the preference and ordinary shares which will be held outside the group, £219,986, there will remain £293,447 for ordinary dividend and reserves. An offer will be made to acquire the 80,000 outstanding B.T.-H. ordinary shares on the same terms as those upon which the 1,920,000 shares are being purchased from the International General Electric Company of America. This offer, if accepted in full, will entail the issue of a further £48,000 of Metropolitan-Vickers Electrical Co., Ltd., ordinary capital, making the total issue £3,498,900. It is proposed to alter the name of the company to a title more in keeping with its enlarged activities. In order, however, to preserve valuable goodwill which has been built up in the present name, it is intended to carry on the business of Metropolitan-Vickers Electrical Co., Ltd., through an existing subsidiary company under the proposed title of Metro-Vick Electrical Products, Ltd., of which the company owns all the shares. In accordance with an agreement which has been entered into with the holders of the deferred shares of the company, the whole of the existing issue of 500,000 deferred shares of 1s. each (fully paid) will be converted into 25,000 ordinary shares of £1 each (fully paid).

It is proposed to alter the voting rights so that the preference shareholders (who at present are alone entitled to vote) and the ordinary shareholders shall have one vote per share. Undertakings have been received from a sufficient number of preference shareholders to ensure this being carried through. It is also proposed to increase the number of directors from 11 to 18. When the necessary meeting has been held, Mr. W. C. Lusk and Mr. Norman B. Dickson will join the board. In the meantime, in order to preserve the interests and connection of the former directors who are not now members of the board, they have consented to act as directors of the above-mentioned subsidiary company. Sir Philip Nash will join the board of the British Thomson-Houston Co., Ltd.

Atlas Light and Power Co., Ltd.

The annual meeting was held on November 8th. Sir George A. Touche, Bt. (chairman), in the course of his speech, said that he had no doubt that the new President of Argentina would see that foreign capital was fairly treated. He also emphasised the importance of Uruguay to British traders. The competition in the electricity supply industry of South America made a progressive policy essential, and capital had to be expended continually. It was for this reason that the shareholders were asked to sanction last August an increase of £1,000,000 in the company's capital. The chairman then proceeded to review the business of the company's subsidiaries. Referring to developments at Santa Fé, he mentioned the extension of the port, and said that the company had secured permission to carry a transmission line to Parana which would be supplied from the new 12,000-kW power station, which was now practically completed. The electricity supply and tramway receipts in Santa Fé had reached record figures. The company now held the whole of the capital of the companies operating power stations and tramways in Parana, and the business there continued to progress. The Cordoba electricity and tramway businesses showed great growth, but the Montevideo tramways had been adversely affected by motor-'bus competition. In spite of labour troubles the results of the operations in Tucuman showed a decided improvement. The Atlas Company's balance sheet showed that "investments at cost" had risen from £6,825,796 to £8,380,437. The increase was mainly due to the new acquisitions in Tucuman and Parana (£1,067,343), and additional investments in Cordoba (£133,294), Santa Fé (£184,026), and Montevideo (£158,621). It was proposed to issue only half of the £1,000,000 new capital at present; this would be issued in units consisting of one £1 preference share and one £1 ordinary share to existing holders of ordinary shares, the proportion being one to eleven. Sir George concluded by stating that the company was not straining after quick and early profits; it was the aim to build up a great company on firm foundations.

Stock Exchange Notices.

Dealings in the following have been specially allowed by the Committee under Rule 159:—

Metropolitan-Vickers Electrical Co., Ltd.—1,136,950 new ordinary shares of £1 each, issued at £1 5s. per share, partly paid and fully paid, Nos. 3,385,001 to 4,521,950.

The undermentioned have been ordered to be officially quoted:—

East African Power & Lighting Co., Ltd.—270,000 ordinary shares of 20s. each, fully paid, Nos. 1 to 270,000 (London Register), and 270,000 7 per cent. cumulative preference shares of 20s. each, fully paid, Nos. 1 to 270,000 (London Register).

London Power Co., Ltd.—£4,000,000 5 per cent. debenture stock.

Northampton Electric Light & Power Co., Ltd.—446,890 ordinary shares of £1 each, fully paid, within Nos. 75,001 to 522,490.

Underground Electric Railways Co. of London, Ltd.—49,484 ordinary shares of £1 each, fully paid, Nos. 5,829,311 to 5,878,794.

Ward (Thos. W.), Ltd.—375,000 ordinary shares of £1 each, fully paid, Nos. 725,001 to 1,100,000, and 125,000 5 per cent. Second cumulative preference shares (free of income tax) of £1 each, fully paid, Nos. 475,001 to 600,000.

Erinoid, Ltd.

Mr. Andrew Binnie (chairman) presided at the annual meeting on November 8th, and, in presenting the report and accounts, said that the assets side of the balance sheet now contained nothing which was not of a tangible character. The French company was now earning good profits, and was well established; an interim dividend at the rate of 10 per cent. per annum had been declared in respect of the current year. The French board might consider it desirable to issue additional capital. There were indications that the American company was receiving large orders in spite of the competition of celluloid. That company, however, had to meet the dividend upon the 7 per cent. preferred stock before any dividend could be paid on the common stock. In conclusion, the chairman referred to the death of Mr. Beck, a director, and said that Mr. A. E. Parker had been appointed to the vacant seat on the board.

Prospectuses.

Universal Gramophone & Radio Co., Ltd.—This company, whose registration was recorded in our last issue (p. 811), made an issue last week of 560,000 ordinary shares of 5s. each at par. The prospectus gave the directors' names as Sir Louis A. Newton (chairman), Major the Hon. R. E. Eden, Mr. H. G. Furlong, M.I.E.E., and G. D. Le Lievre (managing director of Radofone (1928), Ltd.); the registered office is at 153, Moorgate, E.C.2. The company is to manufacture a special type of exponential horn for gramophones, &c., which, it is stated, is being adopted by Standard Telephones & Cables, Ltd., for its "public address" system; and also to acquire world rights in the "Murkham" gramophone "pick-up." Combined gramophones and radio sets are to be produced. The company is paying £20,250 in cash and £85,000 in shares for various assets, and expects to have a working capital of £92,000.

Ever-Ready Trust & Finance Co., Ltd.—The registration of this company is recorded in our "New Companies" section. On Wednesday last the company offered for subscription 500,000 ordinary shares of £1 each at par. The prospectus stated that the company's principal objects were to enter into arrangements with the Ever-Ready Co. (Great Britain), Ltd., which provided for financial and business co-operation in the expansion which that company's directors had under consideration. Of the present issue 336,000 shares are reserved for subscription by the shareholders of the Ever-Ready Co. (Great Britain), Ltd., and in a letter advising them to exercise their rights, the chairman and managing directors stated that

in the past the directors had been frequently asked to consider promising proposals which they felt should be declined because they were not sufficiently closely allied to the company's existing business to warrant the employment of the company's funds. Further, they had recently been approached by several large undertakings of a similar nature to the company, in this country and on the Continent, requiring capital on a large scale. The directors had therefore come to the conclusion that such opportunities could best be dealt with by a separate financial organisation. The whole of the proceeds of the issue, and from the issue for cash of the deferred shares to the Ever-Ready Co. (Great Britain), Ltd. (£95,000), and the directors of the Trust & Finance Co. (£5,000), less brokerage and preliminary expenses, will be available for working capital.

Amazon Telegraph Co., Ltd.

The report for the year ended June 30th last records a gross revenue of £56,680 (against £62,114 in 1926-27) and working expenses of £35,968 (£34,221). After providing for debenture interest and sinking fund and income tax, and adding £3,412 brought in, there remains a balance of £940 to be carried forward.

A. J. Stevens & Co. (1914), Ltd.

There was a loss of £47,405 during the year ended August 31st, as compared with a profit of £4,675 in 1926-27. This is reduced to £31,677 by the balance brought forward. The directors propose to take £55,000 from the reserve fund and, after meeting the preference dividend, to carry forward a balance of £11,323.

International Power Securities Corporation.

The report for the year ended September 30th last shows that the gross earnings rose from $2,545,667 to $3,171,668, and the net income from $288,242 to $555,301. A dividend of $6 per share has been paid on the preferred stock.

Callender's Share and Investment Trust, Ltd.

The net profit for the year ended August 31st rose from £18,841 to £27,681 and the dividend is raised from 10 to 15 per cent. (1s. per share already paid).

British Electric Traction Co., Ltd.

Interim dividends as follows have been declared: 3 per cent. on the 6 per cent. cumulative participating preference stock; and 4 per cent. on the 8 per cent. non-cumulative preferred stock.

Cawnpore Electric Supply Corporation, Ltd.

An interim dividend of 3 per cent. has again been declared on the ordinary shares.

Madras Electric Supply Corporation, Ltd.

An interim dividend of 2½ per cent. (free of tax) has been declared on the ordinary shares, as last year.

Siemens Bros. & Co., Ltd.

An interim dividend of 2½ per cent. has been declared on the ordinary shares, as last year.

Brampton Bros., Ltd.

The directors recommend an ordinary dividend of 7½ per cent for the past year. The net profit was £11,479.

French Companies.

The *Société de Constructions Electriques de Nancy* reports net profits of 755,000 fr. for 1927-28, as compared with 931,000 fr. in the previous year; the dividend is maintained at 9 per cent.

The *Société Industrielle des Téléphones* reports net profits of 7,480,000 fr. for 1927-28, against 10,139,000 fr. in the previous year. It is expected that the dividend will be 24 fr. per share, comparing with 40 fr. in 1926-27.

Dutch Company.

The Amsterdam correspondent of the *Financial News* reports that the directors of Philips Glow Lamps have decided to issue to existing shareholders one share of common and preferred stock for every five held. The common shares will be offered at 250 guilders and the preferred at 130 guilders.

Stocks and Shares.

MONDAY EVENING.

THE result of the Presidential election in the United States, the figures in respect of which were declared last week, had no special effect upon Stock Exchange prices, although it had been expected in advance that if Mr. Hoover obtained a sweeping majority this would be regarded as a bull point for the stocks and shares in which New York is particularly interested. In point of fact there was a mild anti-climax following the election, and prices moved very erratically. American and Canadian utilities, the prices of which had been hanging to some extent upon the advance anticipations of what would happen in connection with the Presidential contest, gave way from the top, but, after a few days a tendency to recover became manifest. There is, however, no great British public interest being taken in the market for American industrials; and the number of people who are speculating in American industrials and utilities is comparatively small.

Marconi Excitement.

The Marconi market continues to be a centre of lively activity and a good deal of excitement. The Americans are taking an active hand in the shares, and it is said that a good many thousands crossed the Atlantic during the month of October. There is no doubt as to the company having a large American proprietary. The price of the shares has touched nearly £4, New York accepting London's prices when the latter have been put up with a run, and London being a fairly consistent seller to New York. The price is 3/16 better on the week at 78s. 9d. The £1 shares have risen to 5, and Canadian Marconis took a jump to 40s. 9d.

Cable Stocks and a Bull Account

The cable quartette ought to have benefited from the rise in the prices of the Marconi shares, but, although the tendency has been firm after the fall of last week, the actual movements are not great. Eastern ordinary rose 5 points from 252, but reacted to 255½, and a similar course has been pursued by the other members of the quartette. It is argued that if Marconis are worth anything like £4 a share, Eastern ordinary should be standing nearer 270 than 250.

Something of a bull account, it may be, exists in the stocks of the cable companies, although it is obvious, from the prices at which the stock and shares stand, that the average speculator is not likely to pay any particular heed to these securities. The speculative investor who has taken them up, and put them into his bank in such cases as those where he has been unable to finance the purchases himself, is of a sounder class than the in-and-out operator who works on a limited amount of capital, and who usually views the approaching end of a Stock Exchange settlement with a certain amount of uneasiness. Substantial lines of these cable stocks have been bought by companies and by private individuals with a view to holding them until the fusion has been completed on the lines which have been indicated here on various previous occasions. After this, the securities in the two proposed new companies will be duly distributed in their proper proportions to the present holders of shares in the companies concerned.

L.C.C. Trams.

The London County Council sat for 17 hours continuously in its deliberation on the future of the trams. The Special Traffic Committee, it may be recalled, had recommended that legislation be promoted to enable the Council to enter into agreements with the Underground Railways embodying the principles of common management and a common fund. Some of the Labour Party opposed the recommendation, but it was duly carried by 63 votes to 14, after a debate in which there were no fewer than 30 divisions. The chairman of the Special Traffic Committee, Sir Oscar Warburg, remarked afterwards that the session had been one of the most arduous times he had witnessed, although he had sat through longer discussions. "Still," he said, "we have won our day." The result in the Stock Exchange was almost negligible. Advances in prices had occurred beforehand, and on the actual acceptance of the Special Committee's recommendations, no fresh buying became stimulated. London United Tramways ordinary and preference remain at 2s. 6d. and 8s. 9d., respectively; London and Suburban Traction preference are 11s. 6d., Metropolitan Electric Trams 2s. for the ordinary and 7s. for the preference.

The District s Diamond Jubilee.

Underground Electric Railways ordinary shares and income bonds have risen on account of the dividend estimates quoted here last week. The bonds are up 4 points at 127. Districts remain steady at 79. The District Railway is celebrating its diamond jubilee, the first section of the line having been opened, between High Street, Kensington, and Gloucester Road, on October 1st, 1868. An experimental electric service was started between Earl's Court and High Street, Kensington, in May, 1900. The fare was 1s., and the service was withdrawn in less than six months. Five years later, in May, 1905, electric trains started running from Ealing to Whitechapel, and all steam trains were withdrawn very shortly afterwards. The company came under Government control on the outbreak of war in August, 1914, and was released therefrom in August, 1921. The District Railway can remember Earl's Court as an area of market gardens: Hammersmith and Fulham as little more than villages. It is a fair claim for the railway to make that the District has done as much as anything else to assist in the development of London in those parts served by its system.

Metropolitan-Vickers.

Publication of the full terms of the Metropolitan-Vickers agreement with the International General Electric Company,

Inc., of America, has been made. This gives details of the scheme under which Metropolitan-Vickers will acquire control of the British Thomson-Houston, Edison Swan and Ferguson, Pailin undertakings. A new issue of 1,136,950 ordinary shares is to be made, at 25s., which will rank for dividend as from January 1st next. These new shares will be offered by way of rights. On the basis of the past four years' figures, the four companies' profits show about £293,000 available for ordinary dividend, on an issued capital of £3,450,000. This is equivalent to 8½ per cent. The amalgamation is expected to enable substantial economies to be effected in working costs.

Metropolitan-Vickers ordinary are quoted this week ex rights, and the price, on the new arrangement, is about 30s. Holders can sell their rights, if desired, for about 3s. premium over and above the price, 25s., at which the new shares are offered. Buyers can obtain the rights for about 3s. 3d. premium, and a good deal of business is passing in both directions.

"Tender" Stocks.

The Birmingham District Power & Traction Company, Ltd., has notified the holders of its 4½ per cent. debenture stock that funds are available for a redemption of a portion of its issue, and the company invites tenders from the holders at a price including accrued interest from July 1st, 1928. The company points out in its notice that the middle market price of this stock on October 30th was 79½. The security, being thoroughly sound, and the only thing against the stock being the fact that there is little market in it, should weigh with holders who are uncertain as to whether to tender, and, if they do, at what price. It may be suggested with diffidence that 85 is a reasonable figure to expect, and possibly some holders will consider that they stand a chance of having their stock taken if they tender it up to 90.

One or two other companies in the electrical world are doing the same thing. Holders of the debenture stocks should not be too eager to let their securities go at anything less than several points higher than the market quotation.

Electricity Supply.

In the group of electricity supply companies the prices have suffered something of a check. County of London ordinary are better at 44s., and the 7 per cent. debenture is up to 106, but otherwise the changes show falls on the week. City of London ordinary are again 1/16 down: Metropolitans at 2 3/16 and Electric Supply Corporation at 55s. 9d. have similarly drooped. Amongst the provincials, small declines occurred in Clyde Valley and in Yorkshire Electric. The dullness of the market is due to sales made with the idea of releasing money for the "quick-movers" that have been so popular, and with which some of the would-be profit-takers have got, in the vernacular, stuck. Moreover, the yields offered by most of the good shares are but modest. Despite, therefore, the strength manifested by the investment departments as a whole, the electricity supply section is being subjected to a mild amount of realisations at the present time.

Cable and Equipment.

Reasons of the same kind cover the dullness shown by cable construction and electrical equipment shares, engineering descriptions being affected by a similar cause. Babcocks, British Insulated, Callenders, Enfields and Siemens are lower on the week. General Electrics continue steady at 42s. Crompton Parkinson 8 per cent. preference gave way to 25s.

Ever-Ready shares improved to 29s. 6d. on the issue of the prospectus of the Ever-Ready Trust & Finance Company, offering at par half a million ordinary shares of £1 each. The authorised capital of the newcomer is a million pounds, divided into 900,000 ordinary and a thousand deferred shares, the latter being of £100 each. Everlite shares are quoted this, Monday, evening at 9s. 9d.

The Best Feature.

Mexicans make the best showing on the week. Mexico Trams spurted to 55, and a rise, of no less than 12¼ points, carried Mexican Light and Power common to 90. The buying came, in part, from Belgium, Brussels being an eager supporter of the shares. The preferred shares gained 2 points: the second preference rose to 2 15/16. Of the other "dollar" stocks, Brazilian Traction preferred advanced to 235. In the telephone group, American Telephone at 192½ and Internationals at 193¼ are lower than they were at the end of last week. International Holdings revolve around 14. British Columbia Power have been good at 54½ and 42, for A and B, respectively.

Of the miscellaneous shares, the Burndept Wireless are enjoying mild popularity, the price being about 7s. The company is said to be well supplied with orders. Wireless Pictures are quiet. A heavy tone overspread the general list of coal combustion shares. The rubber share market weakened on a decline to nearly 8½d. per lb. in the price of the produce. Business throughout the Stock Exchange is on a smaller scale than that of a month ago, but one of the main features is the strength displayed by the purely investment markets.

Share List of Electrical Companies.

	Nom.	Dividend. 1926.	Dividend. 1927.	Price Nov. 12, 1928.	Rise or fall.	Yield. p.c.
Home Electricity Companies.						
Bournemouth and Poole	£1	14†	15	8⅜	—	... ...
Brompton Ordinary	£1	8⅜	8½	27/-	—	5 8 8
Charing Cross Ordinary	£1	8½	8½	27/-	—	5 8 8
do. do. 4½% Pref.	£1	4½	4½	17/6	—	5 2 10
Chelsea	£1	8⅝	8⅝	27/6	—	5 1 10
City of London	£1	10	10	80/9	—1/16	4 16 0
do. do. 6% Pref.	£1	6	6	33/-	—	5 4 4
Clyde Valley	£1	8	8	40/-	—6d.	4 0 0
County of London	£1	7½	7½	44/-	+1/-	3 8 ...
do. do. 6% Pref.	£1	6	6	23/6	—	5 2 2
Edmundsons' 7% Pref.	£1	7	7	25/6	—	5 9 10
Elec. Supply Corporation	£1	11	11	55/9	—1/16	3 19 2
Kensington Ordinary	£1	8	8	26/6	—	5 5 8
Lancs. Light and Power	£1	7½	7½	31/-	—	4 16 9
London Electric	£1	8½	8½	26/6	—	5 5 8
Metropolitan	£1	8	9	2 5/16	—1/16	4 2 2
do 4½% Pref.	£1	4½	4½	17/6	—	5 2 10
Midland Counties	£1	6	6½	30/6	—	4 5 3
Mid. Elec. Power	£1	—	15	39/6	—	... ...
Newcastle-on-Tyne Ordinary	£1	5	6	27/6	—	4 7 5
do. 7% Pref.	£1	7	7	35/-	—	5 7 8
Notting Hill 6% Pref.	£10	6	6	10⅝	—	5 11 7
North Met. Elec. 6% Pref.	£1	6	6	33/-	—	5 4 4
St. James' and Pall Mall	£5	8	8	27/6	—	5 1 10
Scottish Power	£1	8	8	33/-	—	4 17 0
South London	£1	8½	8½	27/6	—	5 2 8
Urban Ordinary	£1	7	7	33/3	—	... ...
Westminster Ordinary	£1	8½	8½	27/-	—	5 8 8
Whitehall Elec. Invst. 7½% Pref.	£1	7½	7½	23/6	—	6 7 8
Yorkshire Elec.	£1	8	8	27/-	—1/-	4 6 6

†4% of which was tax free.

Home Rails.						
Central London Ord. Assented	Stock	4	4	73	—	5 9 7
Metropolitan	,,	8	8	65	—	4 12 4
do. District	,,	8½	4	79	—	5 1 8
Underground Electric	£1	1½	5	26/6	+6d.	3 15 6
do. do. Income	Bonds	6	6	127	+4	4 14 6
Telegraphs and Telephones.						
Anglo-Am. Tel. Pref.	Stock	6	6	103½	—	5 17 1
do. Def.	,,	1½	1½	24½	—	6 9 0
Automatic Telephone	£1	10	10	43/9	—	4 9 0
Eastern Extension	£10	10	10	25⅞	+⅛	*3 17 0
Eastern Tel. Ord.	Stock	10	10	255½	+1	*3 18 6
Globe Tel. and T. Ord.	£10	10	10	26	+⅛	*3 17 0
do. do. Pref.	£10	6	6	11⅛	—	5 8 1
Great Northern Tel.	£10	20	20	28½	—	... ...
Indo-European	£5	10	10	47½	—	*5 5 3
Marconi	10/-	5	*10	8 1/16	+1/16	... ...
Marconi-Marine	£1	8⅜	12½	55/-	—	5 9 1
Oriental Telephone Ord.	£1	12	12	3	—	*4 0 0
United R. Plate Tel.	£5	8	8	9½	—⅛	*4 6 6
Western Telegraph	£10	10	10	25½	+½	3 18 6

*Interim.

Home and Foreign Trams, &c.						
Anglo-Arg. Trams First Pref.	£5	5½	5½	3⅜	—	7 11 9
do. do. 2nd. Pref.	£5	6	6	3½	—	8 11 6
do. do. 5% Deb.	Stock	5	5	79½	—	6 5 9
British Electric Traction Def. Ord.	,,	—	—	545	—	... ...
do. do. Pref. Ord.	,,	8	7½	125	—	6 0 0
Brazil Traction	£100	6	7	73½	+1	2 7 9
Brit. Colombia Elec. Rly. Pcc.	Stock	5	5	96½	—	5 2 7
London & Sub. Trac. 5% Pref.	£1	Nil	Nil	11/6	—	... ...
London United Tram Deb.	Stock	4	4	60½	—	6 12 3
Mexico Trams, 5% Bonds	—	5	5	80	+2	6 5 0
Mexican Light Common	£100	Nil	Nil	90	+12½	... ...
do. 7% Pref.	£100	Nil	7	80½	+1	8 13 8
do. 1st Bonds	—	5	5	77	—	6 10 9
Yorkshire (West Riding)	£1	Nil	Nil	5/-	—	... ...
Manufacturing Companies.						
Babcock & Wilcox	£1	18	15	8⅜	—⅛	*4 8 9
British Aluminium Ord.	£1	10	10	2½	—	*4 9 0
British Elec. Transformer Pref.	£1	7	7	18/-	—	7 15 0
British Insulated Ord.	£1	15	15	4½	—⅛	3 12 9
Brush Ord.	£1	10	10	28/9	—	6 19 2
Callenders	£1	15	15	4½	—⅛	3 12 9
do 6½% Pref.	£1	6½	6½	1½	—	5 4 0
Crompton Parkinson Pref Ord.	£1	—	6	19/-	—	6 6 4
do. 8% Pref.	£1	—	8	25/-	—⅛	6 8 0
Edison-Swan	£1	10	10	12/6	—	3 4 0
do. 5% Deb.	Stock	5	5	80½	—	5 11 9
Electric Construction	£1	7½	7½	27/6	—	5 9 1
Enfield Cable Ord.	£1	20	20	4⅜	—⅛	4 6 7
English Electric	£1	Nil	Nil	7/6	—	... ...
do. do. Pref	£1	8	Nil	10/-	—	... ...
Gen. Elec. Pref.	£1	6½	6½	25/-	—	5 4 0
do. Ord.	£1	7½	10	42/-	—	4 16 5
Henley	£1	25	25	5½	—	4 5 0
do. 4½% Pref.	£5	4½	4½	4½	—	5 6 0
India-Rubber	£1	Nil	Nil	13/9	—	... ...
Johnson & Phillips	£1	12½	10	2	—	5 0 0
Met.-Vickers Ord.	£1	8	6	30/- xr.	—	... ...
do. Pref.	£1	8	8	21½	—	5 19 5
Siemens Ord.	£1	7½	7½	28/-	—9d.	5 7 2
Telegraph Construction	£2	10	10	25	—	*4 16 ...

*Dividends paid free of Income Tax.

French Electrical Manufacturing Industry.

The Necessity for "Rationalisation."

THE electrical industries in France formed the subject of a long article by M. Jean-Henri Adam which was published in the May-June issue of the *Revue d'Economie Politique* and has now been reprinted in pamphlet form. The first part of the article is devoted to the development of the electricity supply industry in the past few years, and the second to the manufacturing industry in that country. We reproduce below a translated abstract from the latter part of the article :—

The electrical manufacturing industry, which was plainly inadequate on the outbreak of the war and considerably stimulated during that period for the purpose of national defence, emerged with a prosperity which was perhaps a little artificial because it was due more to the variations in exchange than to technical or commercial efficiency. In 1913 the industry with an invested capital of 300 million francs, produced 60,000 tons of plant of the value of about 200 million francs. In 1926, according to the latest statistics, the production by over 100,000 workers is said to have exceeded 4 milliards of francs on the basis of an invested capital of about 2.5 milliards of francs. The recovery of the currency since July, 1926, reversed this situation, and the industry experienced a serious slackening in the winter of 1926-27, with from 10 to 20 per cent. of the workers unemployed.

With regard to foreign trade, since 1921 the imports have diminished regularly in weight and increased regularly in value, that is to say, the depreciation of the currency has raised the cost of indispensable foreign products. On the other hand, the exports increased in weight and value so far as to reach the record figure of 706 million francs in 1926, as compared with 34 million francs in 1913, thanks to the premium on exports due to the depreciation of the franc and the delay in the adjustment of home prices to the world level. Finally, the excess of exports over imports rose from 200 tons of the value of 50 million francs in 1921 to 20,000 tons, representing 462 million francs, in 1926. In 1927 the trading balance of the industry seems to have been as favourable as in the preceding years, but although the excess of exports over imports remained the same as in 1926, the value was not more than 150 million francs. The similar excess in 1913 was only 2,400 tons. The accompanying tables indicate the details of the imports and exports of electrical plant in the past three years :—

TABLE I.—FRENCH IMPORTS OF ELECTRICAL MACHINERY, &c.

	1925. Metric tons.	1926. Metric tons.	1927. Metric tons.
Dynamo-electric machines ...	3,282	2,122	2,361
Electrical and electrotechnical apparatus	1,181	1,091	1,314
Electric lamps	527	334	271
Insulated wires and cables ...	345	380	1,937
Dynamo armatures and parts of electrical apparatus ...	483	488	430
Accumulators and parts ...	967	446	232
Electrical porcelain, glass, faience, stoneware, insulators, &c.	408	256	148
Miscellaneous	650	754	777
Total metric tons ...	7,843	5,871	7,470

The value of the imports in 1925 is given at 195,700,000 fr., in 1926 at 244,173,000 fr., and in 1927 at 225,645,000 fr.

TABLE II.—FRENCH EXPORTS OF ELECTRICAL MACHINERY, &c.

	1925. Metric tons.	1926. Metric tons.	1927. Metric tons.
Dynamos and transformers ...	4,798	6,416	7,244
Electrical and electrotechnical apparatus	4,896	5,803	6,035
Electric lamps	462	498	544
Insulated wires and cables ...	2,636	2,704	3,526
Dynamo armatures and parts of electrical apparatus ...	1,294	1,242	1,176
Accumulators and parts ...	877	1,459	1,895
Electrical porcelain, stoneware, glass, faience, insulators, &c.	2,994	3,807	3,114
Miscellaneous	2,581	3,981	3,939
Total	20,628	25,912	27,473

The total value of the exports in 1925 were put at 404,516,000 fr., in 1926 at 706,000,000 fr., and in 1927 at 375,389,000 fr.

Concerning the export side of the account, it is shown that the augmentation of 6 per cent. in weight in 1927 was contrasted with a diminution of 88 per cent. in value, which seems much more considerable than the improvement in the franc. The value per ton imported, which was about 4,000 gold francs in 1913, continued to rise regularly from 5,105 gold francs in 1921 to 6,852 gold francs in 1926. On the contrary, the value of the exports per ton declined from 6,537 gold francs in 1921 to 4,034 gold francs in 1926. In 1927 a ton of imports was paid for at an average price of 6,131 gold francs, that is, cheaper than in the previous year, although this diminution does not correspond to the improvement in the franc. But only 2,770 gold francs per ton of exports was received in 1927. Under the circumstances the export industry, after having sold too cheaply during the period of devalorisation of the franc, continues to practise a kind of "dumping," perhaps involuntarily, by agreeing to prices too close to the costs of production and much less than the world market rates. Thus the currency recovery has not arrested the "loss of substance" and the financial situation of the manufacturing companies remains threatened.

If France has been able to retain her place in the world market to a large extent, it is due to the wages being materially less than those in Germany and much lower than those in England, and above all in the United States. The adaptation of the French sale prices to the world level would bring about an increase in the cost of living and wages in France, so that the efforts of the industry must be directed to a reduction of other elements in the costs of production. In fact, the present difficult situation of the industry is due to causes deeper than variations in exchanges and prices, and applies to the structure of the industry itself. This is explained by the fact that there are too many manufacturers, and the note communicated by M. de Peyerimhoff at the last economic conference in Geneva, on behalf of the Union des Syndicats de l'Electricité, denounced the widely scattered and unco-ordinated efforts of different concerns, both in the industrial and commercial departments. Apart from some six or seven large undertakings, which produce heavy and high-pressure plant, there is a large number of works scattered all over the country which turn out small plant and apparatus, at a multitude of works of all sizes which are occupied with the same manufactures. Excepting the example set by two powerful companies which have undertaken a financial concentration and technical reform by regrouping the equipment and closing down inconveniently situated works, the technical and commercial consequences of scattered independent concerns render it impossible to manufacture in quantity, cause the works to be operated at a fraction of their capacity and at high costs of production, and result in disorganised competition and the maintenance of prices which are too low.

The general economic depression renders it necessary to devote more attention to the assaults of foreign competition. In this connection it is mentioned that a recent reorganisation of the German industry permits it to supply plant at prices which at times are 20 to 25 per cent. less than the French prices. Even high Customs duties would not suffice to protect French products, and the only solution consists in reducing production costs. In the circumstances it is considered that a thorough reorganisation of the manufacturing industry is necessary. It could be carried out by the application of the principles for the rationalisation of production in general indicated by M. E. Mercier at the Congress of Organisation in 1927. The idea is to establish "understandings" between the works producing electrical plant and a better grouping of their means of production in order to centralise the general services, specialise the works, standardise the products and equipment, reduce the number of different types, &c. Minds are moving rapidly towards this idea of industrial concentration; friendly advances are being outlined, and it is possible that the individualism of the French race will accept the discipline of a large organisation in the near future. It will then only require commercial methods similar to those in other countries, and the organisation of long-term credits, to permit the industry to harvest the fruits of its rationalisation, both in the prospective development of the home market and the immense fields open in all parts of the world.

Swiss Federal Railways Electrification.

The Swiss Federal Railways are now preparing for the beginning of the second electrification scheme, in connection with which it has been calculated that 1,800,000 francs will be necessary for enlarging the tunnels on the old line Jura-Neuchâtelois, while 1,400,000 francs will be needed to strengthen or replace the iron viaducts which will be called upon to bear the extra weight of the heavy electric locomotives on the Jura-Bernois lines. The near future will also see put in hand certain work which had to be left in abeyance during the electrification. On certain sections double lines will be installed; one of these will be that of Flamatt-Thoerishaus, and a credit of about five millions will be voted to this end.

Minor African Markets.

Imports during 1926 and 1927 into Nigeria, the Gold Coast, Sierra Leone, Kenya and Uganda, and Tanganyika.

THE market for electrical goods in West and East Africa is steadily expanding, as will be seen from the following statistics relating to the Gold Coast, Nigeria, Sierra Leone, Kenya and Tanganyika, which have been compiled from official sources. It will be noticed that Kenya and Uganda are considerable purchasers of electrical material and industrial plant. The values for 1927 for all such goods are given below, with comparative figures for 1926 and notes of increases or decreases:—

Imports into Nigeria.

	1926. £	1927. £	Inc. or dec. £
Electrical machinery—			
Total	7,800	16,700	+ 8,900
From United Kingdom ...	4,800	6,800	+ 2,000
,, U.K. Government ...	2,500	8,600	+ 6,100
,, United States ...	100	600	+ 500
,, Germany	270	600	+ 330
Electrical and telegraphic apparatus—			
Total	47,000	36,500	−10,500
From United Kingdom ...	9,700	4,700	− 5,000
,, U.K. Government ...	31,000	27,800	− 3,200
,, Germany	5,800	3,300	− 2,500

Imports into the Gold Coast.

Electrical and telegraphic apparatus—			
Total	66,700	53,700	−13,000
From United Kingdom ...	4,400	6,400	+ 2,000
,, U.K. Government ...	60,000	42,000	−18,000
,, Germany	460	1,760	+ 1,300
,, United States ...	1,400	2,600	+ 1,200
Electrical machinery—			
Total	14,800	37,000	+22,200
From United Kingdom ...	13,400	14,000	+ 600
,, U.K. Government ...	1,300	22,000	+20,700
,, Germany	—	500	+ 500
,, United States ...	—	150	+ 150

Imports into Sierra Leone.

Electrical and telegraphic apparatus—			
Total	40,700	21,000	−19,700
From United Kingdom ...	19,000	11,000	− 8,000
,, U.K. Government ...	20,000	9,000	−11,000
Industrial machinery—			
Total	1,800	1,400	− 400
From United Kingdom ...	1,100	900	− 200
,, U.K. Government ...	100	—	− 100
,, Germany	—	400	+ 400
Electrical machinery—			
(All from U.K. on Government account)	—	1,700	+ 1,700

Imports into Kenya and Uganda.

Electric wires and cables, insulated—			
Total	6,900	3,700	− 3,200
From Great Britain ...	5,900	3,100	− 2,800
,, Germany	160	300	+ 140
,, Belgium	800	275	− 525
Ditto on Govt. account.* ...	1,800	150	− 1,650
Electric wires and cables, uninsulated—			
Total	2,100	3,400	+ 1,300
From Great Britain ...	1,500	2,400	+ 900
,, Belgium	400	800	+ 400
,, Germany	—	100	+ 100
Electrical goods and apparatus, n.e.s.—			
Total	14,000	19,000	+ 5,000
From Great Britain ...	11,000	12,000	+ 1,000
,, Germany	1,500	1,600	+ 100
,, United States ...	4,800	1,800	− 3,000
,, Belgium	—	3,600	+ 3,600
Ditto on Govt. account ...	9,700†	9,700*	—
Electrical machinery and parts—			
Total	13,000	22,000	+ 9,000
From Great Britain ...	9,500	13,000	+ 3,500
,, Belgium	100	800	+ 700
,, Sweden	250	3,000	+ 2,750
,, United States ...	3,000	5,000	+ 2,000
Ditto on Govt. account ...	500	2,000	+ 1,500
Telegraph and telephone instruments and apparatus—*			
Total	800	3,400	+ 2,600
Ditto on Govt. account ...	15,000	3,800	−11,200
Engines, steam—			
Total	17,600	12,600	− 5,000
From Great Britain ...	11,700	8,000	− 3,700
,, United States ...	3,000	2,600	− 400
,, Germany	3,000	1,600	− 1,400
Electric lamps—			
Total	—	2,100	+ 2,100
Ditto on Govt. account ...	—	60	+ 60
Industrial machinery and parts—			
Total	134,000	130,000	− 4,000
From United Kingdom ...	101,000	104,000	+ 3,000
,, India	3,000	4,000	+ 1,000
,, Germany	12,000	8,000	− 4,000
,, United States ...	13,000	5,000	− 8,000
Ditto on Govt. account ...	20,000	17,000	− 3,000
Pumps and pumping machinery—			
Total	9,500	12,000	+ 2,500
From United Kingdom ...	7,600	7,000	− 600
,, United States ...	1,700	2,000	+ 300
Machinery, not specified, other than agricultural—			
Total	21,000	33,000	+12,000
From United Kingdom ...	17,000	26,000	+ 9,000
,, Germany	4,000	4,000	—
,, United States ...	1,000	2,000	+ 1,000
Ditto on Govt. account ...	44,000	33,000	−11,000

Imports into Tanganyika.

Wires and cables, insulated—			
Total	1,200	1,700	+ 500
From United Kingdom ...	1,100	1,500	+ 400
,, Germany	90	150	+ 60
Electrical goods and apparatus, n.e.s.—			
Total	12,700	17,800	+ 5,100
From United Kingdom ...	11,000	15,000	+ 4,000
,, Germany	700	2,000	+ 1,300
Telegraph and telephone instruments and apparatus—			
Total	7,000	3,900	− 3,100
From United Kingdom ...	7,000	3,800	− 3,200
,, Germany	—	50	+ 50
Electrical machinery—			
Total	80	3,900	+ 3,820
From United Kingdom ...	80	500	+ 420
,, Germany	—	3,300	+ 3,300
Steam engines—			
Total	10,500	2,600	− 7,900
From United Kingdom ...	3,700	1,700	− 2,000
,, Germany	5,800	900	− 4,900
Lamps and lanterns—			
Total	11,400	14,000	+ 2,600
From United Kingdom ...	1,200	1,500	+ 300
,, United States ...	2,600	3,200	+ 600
,, Germany	6,900	8,700	+ 1,800

* Mainly from Great Britain.
† From Great Britain £5,200, from United States £4,400.

Our Foreign Electrical Trade.

The following were the values of imports and exports of electrical goods and machinery during October, 1928:—

	Oct., 1928. £	Inc. or dec. as compared with Oct., 1927. £	10 mths. 1928. Inc. or dec. £
Imports—			
Electrical goods and apparatus	497,474	+ 32,924	+384,489
Machinery	1,488,025	+243,952	+892,339
(Including electrical machinery)	153,324	+ 10,177	+114,261
Exports—			
Electrical goods and apparatus	983,388	+ 45,552	− 35,604
Machinery	4,402,476	−100,857	+4,280,680
(Including electrical machinery)	561,734	+ 21,573	− 64,722
Re-exports—			
Electrical goods and apparatus	12,810	− 3,848	+ 14,944
Machinery	126,560	+ 8,995	+136,494
(Including electrical machinery)	8,787	− 1,751	+ 29,112

Fifty Years of British Industry.

A consideration of industrial combination, the remuneration of capital and labour, co-ordinated research, education, and other modern problems in the light of half-a-century's experience.

By SIR GEORGE SUTTON, Bart.

(*Abstract of an address to the* ROYAL SOCIETY OF ARTS.)

A BRIEF note upon this address appeared in our last issue; we give below an abstract covering the main points contained in it. During the last fifty years many important changes have taken place in the industrial world. Added to the growth in size of the individual undertaking, there has been an increasing tendency towards the amalgamation of firms, or the establishment of groups within a particular industry for the promotion of common interests, and, on the other side, labour, like capital, has achieved its amalgamations and federations. The Companies Acts have done more than anything else to change the course of industry; they have opened the door wide to the enterprise of the individual, without distinction of rank, birth, or privilege. With the development of joint stock companies, especially in connection with new industries, the aristocratic tradition was transformed into a democratic tradition. To-day a very large proportion of the men who are in responsible control of the big firms of the present day rose from the ranks.

The immediate motive which urges men to seek promotion is, of course, the desire to earn wealth. It would be a great mistake, however, to assume that the impulse to make money is the sole or even the dominant motive in the men who have built up or gained control of large industrial or trading concerns. The man who conceives a project, and sets to work to realise it in factories and warehouses, in trained employés, and in all the other phases of a successful productive enterprise, operates very much as an artist does in painting a picture, and enjoys much the some triumph in achievement. It is this constructive faculty, and not a mere acquisitive instinct, which our industrial leaders work so hard to satisfy.

The problem of the proper distribution of wealth, reduced to its simplest terms, resolves itself into adjusting the reward which capital should give to labour for its service. In the early days of industry this question was settled by a process of bargaining in which, we may admit, capital had the last word. To-day we have organised labour confronting organised capital on practically equal terms, and it has become possible to deal with problems of wages and conditions of labour on national lines. The cable-making industry was among the first to establish a successful joint council for the discussion of all questions affecting employés. Thus, in place of guerilla campaigns in which individual unions fought individual firms, and frequently set one against another, there was the possibility of a general conference to arrange the terms of an enduring peace. Personal contact proved a slow but efficient solvent of distrust.

The prevailing rates of wages are fixed partly by custom and partly by arrangements made with the trade unions concerned. Trade union policy aims at uniformity; it is satisfied if the standard rate of wages is accepted by all employers and paid to all workmen, irrespective of the personal merit of the worker or the prosperity or otherwise of any particular factory or group of factories. To illustrate this: shipbuilding and some branches of engineering are in a depressed state. On the other hand, cable-making is prosperous. Within that industry itself there are degrees of prosperity. If the level of wages were regulated by the prosperity of each separate undertaking, the workers in the less prosperous concerns might feel a sense of injustice which would introduce an element of discord. Another anomaly is the disparity of wages in sheltered and unsheltered trades, which has a tendency to attract into lower-grade occupations men who would be capable of giving better service in skilled work. The ultimate object of trade union activity is to secure to labour a larger share in the results of industry, and it is realised by the representatives of labour that this is a very complicated problem not capable of complete solution merely by incessant action to force up the general level of wages. When this problem is considered, most people's thoughts turn to piecework and profit-sharing. Piecework, however, is applicable only to certain types of labour, and it is not regarded with much favour by the trade unions, but it may be hoped that in the better spirit of mutual confidence which prevails to-day it will become possible to extend the piecework system on a basis satisfactory to both parties. In some quarters profit-sharing is regarded as a complete solution of the problem. So far as manufacturing industries are concerned, it is better to aim at a system which secures to each grade of worker the highest possible wage, rather than to attempt to apply a rigid profit-sharing system to a constantly changing set of conditions. There are cases where profit-sharing has been successfully applied and is firmly established; on the other hand, there are cases where it has not proved popular. Co-partnership is somewhat different, but the only type of company in which a worker should be encouraged to invest his savings is one of a steadily prosperous character. These are precisely the cases where the price of the shares advances far beyond the nominal value and gives the purchaser a yield not much greater than on a gilt-edged stock If, however, the company allows its employés to acquire shares at par, it must consider that it is presenting them with a substantial bonus at the expense of other shareholders.

There is a tendency of firms engaged in the same industry to unite for mutual benefit. The traditions of independence are slow in dying, and even to-day there are many industrial groups where the members chafe under the chains of co-operation, and threaten at frequent intervals to break them. The Cable Makers' Association was one of the first bodies of its kind to be formed. At the inception of the electricity supply industry, the cable-making firms became acutely conscious of these problems and also of the opposition between the need for a high standard of quality and the desire for cheapness. They also realised that there was nothing to distinguish, in the sight of the ordinary buyer, a high-grade cable from a low-grade one. There was an obvious danger that unregulated competition would make price the sole consideration and would thus bring about a steady deterioration in quality. To avert this danger, the leading firms came together twenty-nine years ago and formed an association primarily for the purpose of fixing and adopting standards of dimensions and quality in electric cables. To-day these standards are recognised all over the world. This co-operative action extended to the field of competition. The Association proceeded on the assumption that the field was large enough for the growing prosperity of all of them, and that their individual as well as their common interests and those of electrical enterprise as a whole would be best served by keeping competition within reasonable bounds. This view was not shared spontaneously by the public or by the buyers of cables, but the policy has been justified, and the C.M.A. rightly claims that it has demonstrated that it is possible for a number of firms, entirely independent of one another financially, and, broadly speaking, working competitively, to concentrate the competition on being one of quality and effective service to the customer, rather than on to a ruinous price cutting.

The principle of industrial combination is now as firmly established as the principle of amalgamation which came into force about the same period. The object of amalgamation is to secure greater economy in production, management and salesmanship, greater financial stability, and a firmer hold over raw materials and the conditions of sale for the final products. Where firms are engaged on precisely the same form of production, or where they contribute their several manufactures to cover a particular industry, amalgamation will secure its object if judiciously carried out on sound financial lines. There have been, however, cases of amalgamation where firms have absorbed others with which they had no organic relation, with disastrous results. The tendency of the time is to concentrate the power of control over production by mergers or amalgamations in one form or another. At the same time, where manufacturers remain independent, there is a complementary movement towards unity by the formation of industrial and trade associations. Both movements will tend to greater prosperity for everybody engaged in industry and to better service to the community.

The better organisation of industry, both by amalgamation and the formation of associations, has a direct bearing upon research. A large amalgamation or association can afford to face the cost and accept the chances of research on elaborate lines. Each member of the Cable Makers' Association has been engaged upon independent research for a number of years. But it is inevitable that several of the cable research laboratories must be engaged simultaneously upon the same problem. Duplication of this kind tends to waste of effort, and arrangements have recently been made for co-ordinating the material and mental resources of many cable research laboratories on the main problems.

With regard to education, in connection with which the Royal Society of Arts has played a most distinguished and useful part, if we are to make the best of the material which the school provides for the manning of our industrial army,

we must enlarge the opportunities for education until they are open to all. Of late years there has been an increasing desire to employ public-school boys in industry, but what the employer wants is a combination of higher education and practical experience. Under present conditions this combination is generally impracticable. Whether it is possible, by some revision of our system of training, to secure a measure of both qualities in the young men who are fitting themselves for responsible positions, is a problem which our educational authorities should seriously consider. Excellent results have been achieved in technical training when a really great teacher gets around him a body of students attracted by the tradition of his teaching. Two outstanding examples in the electrical world are the old Finsbury Technical College under Prof. Ayrton, and the other the Faraday Training Institution under Prof. Harrison and Dr. Alexander Russell.

Overhead Electric Lines.

An account of the work of the British Electrical and Allied Industries Research Association relative to the strength of wooden poles, single and braced, and the wind pressure on wires and cables, and on wooden poles and lattice structures used for supporting overhead electric lines.

By W. B. WOODHOUSE, M.I.E.E.

(Extracts from Paper read before the INSTITUTION OF ELECTRICAL ENGINEERS.)

THE British Electrical and Allied Industries Research Association's comprehensive research into the problems relative to materials and methods of overhead power-line construction and uses has been productive of valuable results of immediate practical application, and the investigation is being extended considerably beyond the original plan.

Wooden Pole Tests.

Tests under practical conditions disclosed fundamental weakness in the usual design of compound wooden poles and led ultimately to the development of a much improved design, the greatly increased strength of which has been confirmed by tests on small-scale models.

The use of wooden poles for overhead power lines has followed very closely the practice of the Post Office, whose extended experience of the use of such poles has decided that the red fir obtained from Northern Europe when creosoted is particularly well suited to the purpose. A general description of such poles is contained in British Standard Specification No. 139—1921; accurate figures of their rupturing strength have been obtained.

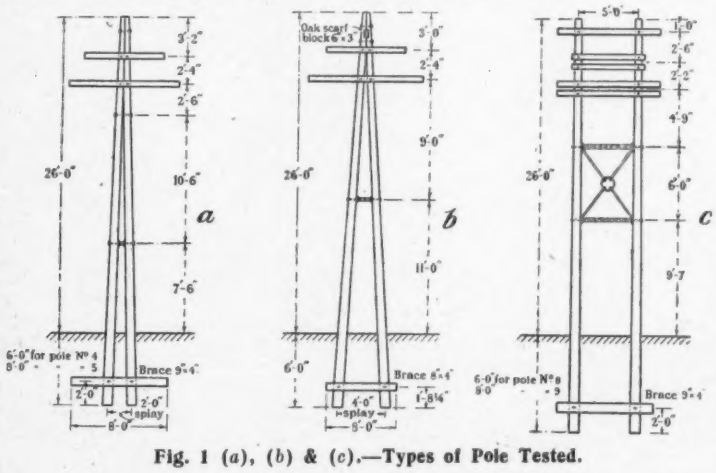


Fig. 1 (*a*), (*b*) & (*c*).—Types of Pole Tested.

The average value of the maximum fibre stress obtained from tests on sections was 12,000 lb. per sq. in., which may be compared with the figures contained in the Post Office Engineering Department's publication entitled "Technical Instructions XIII," which are equivalent to 7,800 lb. per sq. in., and to those given in Mr. C. Wade's paper,* which average 7,200 lb. per sq. in. The figures emphasise that in such a material as wood a substantial margin of strength must be allowed. The Regulations of the Electricity Commissioners require a factor of safety of 3.5 on a maximum fibre stress of 7,800 lb. per sq. in., an allowable stress of 2,200 lb. per sq. in.

"A" Poles.—The first two tested were of the type shown in fig. 1 (*a*). At the time of the tests it was generally held that the strength of such a structure was from four to five times as great as that of one pole, this view being based on the results of a series of experiments carried out by Mr. C. Wade in conjunction with Prof. J. Goodman.* The Research Association's tests show that this assumption is unjustified and that the strength of an "A" pole of the type tested is very much less. The error arose because the method of test adopted for their experiments did not accord with the actual conditions of use. Actually failure under load in practical use is preceded by a relative movement of its members in the ground against the insufficient resistance of the structure and of the surrounding earth. The overturning force applied to the top of the pole is resisted at the base by the compression of the earth by the one leg and by the resistance to uplift by the other or tension leg. These reactions tend to distort the structure; they are resisted by the scarf joint and cross arms at the top, the cross bolt midway and the brace block at the base. Regarded as a framed structure, the "A" pole is not well designed to resist the stresses to which it may be subjected. The poles tested actually failed by the distortion of the structure arising from their insufficient resistance to shear stress. From this simple, but important, conclusion the design of compound poles has been entirely reconsidered and put for the first time on a sound engineering basis.

For the second series of tests the design of the poles was modified, the splay being doubled and an oak shear-block fitted in the scarf [fig. 1 (*b*)], which had the effect of increasing foundation reactions against overturning. The poles were not distorted, but were simply pulled out of the ground by a force very much less than that required to cause failure of a similar structure with a rigid base.

It had become clearer as the tests proceeded that the usual foundations were lamentably weak: for example, on the usually accepted basis of calculation and with a factor of safety of 3.5 the safe loading of such a pole should be 2,240 lb., and the pole should fail at a load of 7,840 lb.; actually a load of 450 lb. was sufficient to overturn it.

In disclosing this fundamental weakness the tests are of great value; they show how far such poles fall short of the strength they would attain under conditions which utilised the full strength of the components, and that their weakness is due to poor foundations, to inefficient bracing, and to neglect to provide resistance to shear stress.

Such poles and foundations, however, have been used for years to support power lines, and records of their failure are conspicuous by their scarcity. The gap between theory and practice would appear impossible to bridge except by the assumption that the actual loading has been much less than that considered likely to arise.

"H" Poles.—Made in the usual Post Office manner [fig. 1(*c*)], failure occurred in a similar manner to that recorded for the "A" poles, with the difference that the first point of fracture was in the compression leg at ground-level, followed by the fracture of the compression member at the bottom of the centre bracing. Insufficient foundation reaction was again a contributing cause of failure, the lifting of the tension leg resulting in an excessive bending moment in the compression pole at the ground-level. An additional 2 ft. in the depth of setting gave 67 per cent. increased strength against overturning.

French Poles.—The claim had been made that the strength of this type of structure [fig. 2(*a*)] to resist bending was five times that of a single pole, because the modulus of section of two circular poles side by side is five times that of a single pole; but a consideration of resistance to pure bending is insufficient; shear stress must be taken into account. The results indicate inadequate resistance to shear stress, and consequently that the modulus of the double section is not an index of the strength of the pole. Failure commenced at the top foundation block, the section where the shear stress is

* *Journal* I.E.E., 1907, Vol. 39, pp. 304 and 321.

a maximum, and everything was very much adrift below ground. If the strength of these poles had been five times that of a single pole, as was claimed for the design, the breaking load would have been about four tons; actually they broke at 1.7 and 1.42 tons, respectively.

Rutter Poles.—This design [fig. 2 (*b*)] is intended to utilise to the full the strength of individual poles whilst retaining the advantage of the small ground space occupied by the French pole. The tests showed that the means adopted to provide resistance to shear is effective, and enables full advantage to be taken of the resistance to bending of the double-member pole. In other words, it is a braced frame proportioned to resist the stresses to which it is subject, whereas the other compound poles were constructed without any serious regard to the shear stresses which arise.

Wedmore Poles.—This is a design of Rutter pole with the unit poles initially stressed by bending in such a manner that advantage may be taken of the greater strength of the wood in tension than in compression [fig. 2 (*c*)].

An incorrect amount of initial bending may weaken the pole. If the correct value of the initial stress had been applied, the test load could have been doubled before the actual stresses met with in the test were reached.

Conclusions.—It may be said that the Wedmore pole is the strongest, and permits of deeper notching of the shear blocks. If the maximum fibre strength of each unit pole is

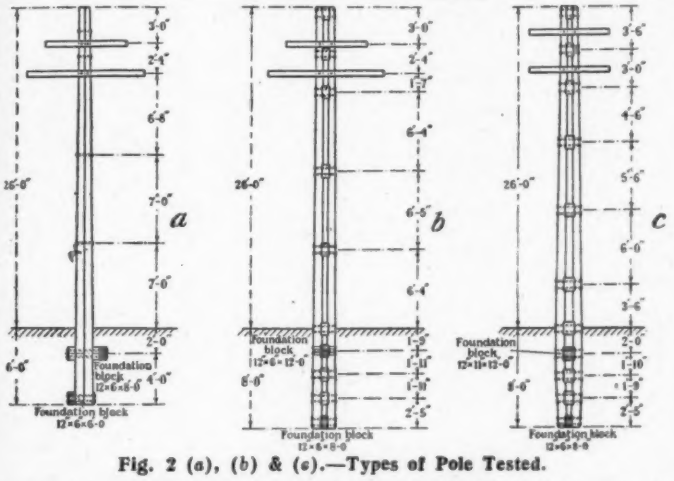


Fig. 2 (*a*), (*b*) & (*c*).—Types of Pole Tested.

utilised, the strength of the Rutter pole should be eight times that of a single pole, while the strength of the Wedmore pole should be even greater. On the full-scale tests of Rutter poles the average observed strength was six times that of the single pole, or more than three times that of the French pole, which shows a striking gain in the economical use of the materials due to skilled design.

The tests of the various types of poles as a whole have brought out clearly the necessity for further knowledge of the behaviour of earth foundations, which subject is now being studied by the Research Association and is yielding results which will greatly simplify and improve present practice. The Association's work has for the first time placed the design of compound poles on a sound basis, has condemned as unsound and uneconomical the types in common use, and has evolved new designs in which the materials are used to greatly increased advantage. The more accurate data resulting from these tests and the more definite basis of design of overhead lines should lead to greater security and lessened cost.

Wind-pressure Tests.

The Association found that great uncertainty existed about the pressures exerted by the wind on engineering structures, and that text-books were full of contradictory statements. The report of the Association which the author submits to the Institution (see extracts below) marks a definite and important step forward in our knowledge of the subject.

Definite values of the coefficient relating wind pressure with velocity have been recorded, the figures being of considerable value to designers. Sufficient data have been obtained to enable, for the first time, a proper allowance to be made by them for wind pressure on wires and cylindrical poles of the sizes commonly used for electric power lines, and it has been shown that the wind pressure on a fabricated frame may be estimated from data obtained by tests on standard sections. Recent experiments in wind tunnels at the National Physical Laboratory have been made with a high degree of accuracy and have produced consistent results, the wind velocity being maintained constant and the flow uniform in each case.

B.E.A.I.R.A. Technical Report F/T16, entitled "Investigations on Wind Pressure on Poles and Cables for Overhead Transmission Lines," has been added as a supplement to this paper.

A curve showing the relation between V (wind velocity, m.p.h.) multiplied by D (diameter of wire, inches) and coefficient K′ has been plotted from a research on the wind pressure on small wires, the diameters ranging from 0.002 in. to 1.25 in. The coefficient K′ when multiplied by the square of the wind velocity in miles per hour gives the pressure in lb. per sq. ft. of projected area (or $P=K'V^2$). There is one value of K′ corresponding to any one value of $V\times D$, but the value of K′ varies with this product. Taking, for example, as limiting sizes of single wires in common use, No. 8 s.w.g. (0.16 in. diam.) and No. 000 (0.372 in. diam.), the pressures corresponding to a wind velocity of 60 miles per hour are:—

Diameter, in.		Pressure, lb./sq. ft.
0.16	...	10.15
0.372	...	10.8

The corresponding pressure on a wire of 0.041 in. diameter is only 8.75 lb. per sq. ft.

The experiments on smooth round wires above referred to were extended by a series on smooth cylinders of 3 in. and 9 in. diameter, respectively, with wind velocities ranging from 20 to 100 ft. per sec. (14 to 68 m.p.h.). The results, representing pole sections, show the existence of violent critical effects at certain velocities and encourage the careful consideration of dimensions in relation to the maximum wind velocity likely to be experienced.

Tests made to ascertain the wind pressure on stranded cables are not very consistent. The small variations of form of surface due to the stranding of the wire causes a considerable variation of the value of K′, and the subject requires further study. Sufficient data have, however, been collected to enable the engineer to make proper allowances for wind pressures on wires and cylindrical poles of the sizes commonly used for overhead lines.

The Report deals with the tests in detail, and may be commended as deserving careful perusal.

In order that the effect of the application of this research to practical conditions may be fully appreciated, the results obtained have been used to calculate the total pressure on poles of various sizes under the most severe weather conditions likely to be experienced. Except in the cases of a few of the longer poles of large diameter when the wind pressure is 80 m.p.h., the values obtained from these calculations are very much less than those which are being used in practice. In view of the elaborate and careful manner in which the researches have been carried out, and the fact that the existence of the critical point has been confirmed by independent work carried out by German investigators, it would appear that serious consideration should be given to the advisability of adopting data equivalent to those set out in the technical report for the basis of overhead line design.

[The paper was illustrated with lantern slides and a kinematograph film of the poles taken whilst they were being pulled, which was of assistance in the interpretation of the results of the tests.]

Discussion in London.

Mr. J. E. RUTTER, with the aid of lantern slides, illustrated the manner in which poles failed under test. Earlier experiments had been made with the pole base fixed rigidly as in a vice, which condition did not obtain in practice because of base movement and earth reaction thereto. The magnitude of the stresses to which poles were subjected was not generally appreciated.

Col. R. E. CROMPTON, whilst appreciating the value of the results already achieved, stressed the necessity for still further research. Considering the superiority of the ferro-concrete posts used extensively in Switzerland, Northern Italy, and Southern France, he hoped the use of wood poles would cease in time.

Mr. R. BORLASE MATTHEWS suggested the use of concrete sockets in the ground to impart rigidity and protect the pole base against the weather, obviating the creosoting process. He agreed that wood poles should be gradually abolished; sawn-timber structures had their uses, but the line of least resistance for the taller poles that would be needed under the new regulations would be the adoption of ferro-concrete, or steel tubular or sectional structures.

Mr. E. B. WEDMORE, in appealing for more money with which to carry on research work, pointed out that all the results detailed in the paper could have been obtained 10 years ago if the money had been available then. A year ago he had reported to the I.E.E. that the investigation had had to be postponed for lack of funds; they had not got the money yet, and the industry had had to wait all that time for the information now announced. It should be remembered that ferro-concrete poles were heavy to transport across fields and soft ground; they were not allowed to be carted along roads and dumped alongside. What was their real safety factor? It could be found in a few months if the necessary money were available for tests. The curves illustrating the results of wind-pressure tests on smooth circular wires and poles were an example of the great danger of basing calculations on extensive extrapolations of curves. Few investigators would have hesitated to prolong the curves upwards, whereas

actually they indicated two critical points, falling steeply before rising again, due to the presence of eddies which did not exist at the lower wind speeds, and therefore could not be known to exist.

Mr. C. WADE expressed the opinion that his earlier experiments with test poles fixed rigidly at the base did not introduce an error, but indicated the results which should be approached if improved foundations were employed. The manufacturer of Wedmore poles might experience some difficulty in ensuring the correct initial stress.

Mr. N. HERWALD (nominee of the London Students' Section) did not agree that small model tests would give results comparable with full-scale trials. Rigidly fixing the pole base in the ground might not be so important as it would seem.

Mr. C. H. SMYTH drew attention to the importance of the author's statement that "The overturning force applied to the top of the pole is resisted at the base by the compression of the earth by the one leg and by the resistance to uplift by the other, or tension, leg." Neither the Wedmore nor the Rutter pole incorporated any device which would resist that uplift; the "Anchora" pole foundation (which he illustrated with lantern slides) did so, however, having been designed for that purpose, and at 20,000 V such a line would be, say, 20 per cent. cheaper than a normal one.

Major T. RICH said there was no need to begin making tests on ferro-concrete poles as ample information was available on the Continent, where they were made and used in large quantities. Under the present regulations they were, however, not eligible for use in England. The paper dealt with a material (wood) which was not grown in this country, and it was not used on the Continent when large stresses were involved; the so-called French pole he had never seen in France. The through bolt used "to increase the strength" of the poles was placed at the very position where the structure was most likely to fail. If the earth itself was not strong enough to resist the forces, why was it necessary to use such expensive structures to support the lines?

Mr. J. L. EVE (Foundation Co.) thought that the problem resolved itself into the provision of "super" foundations for the respective types of pole. The spacing of conductors on long spans in this country was somewhat greater than was necessary.

Mr. W. B. WOODHOUSE, in reply, associated himself with Mr. Wedmore's remarks. The results outlined in his paper had been applied by members of the Research Association some time ago, he said, and if others desired early information they could obtain it by joining the Association. The types of poles tested were those in common use when the tests commenced; to-day, of course, several kinds of foundation were employed. He could not agree that they would be able to do without wood poles for some time to come: each type had its uses, but the conditions which had to be provided for very rarely occurred in practice. The Electricity Commissioners, however, had to proceed with caution; when results were submitted to them they would no doubt make concessions and relax their regulations.

The Electrical Industry.

Some Reflections on the Trend of Events and Future Aspects.

By F. S. G. HININGS, M.I.E.E.

(*Extracts from Chairman's Address before the* NORTH-MIDLAND CENTRE *of the* INSTITUTION OF ELECTRICAL ENGINEERS *at Leeds.*)

THE generation and transmission of power electrically having been organised on a scientific basis, the necessity for a more complete survey of the distribution situation is needed, with a view to defining a policy which would make for the more effective marketing of electricity and the more rapid extension of distributing mains.

Although there have been innumerable sales conferences of manufacturing organisations, which have also assisted in financing the Electrical Development Association, there is a general feeling that more might be done by the supply authorities themselves in the way of commercial propaganda and the efforts they make from time to time to extend electrical services. On an average the supply authorities are spending annually about £60,000 on Press advertising and other publicity, which represents about .25 per cent. of their revenue. There are a number of authorities which spend up to 1 per cent., while a great many devote nothing at all. Advertising expenditure in electrical manufacturing businesses in America represents roughly between 1¼ and 10 per cent. of the annual turnover. It is up to engineers to impress on electricity committees the narrow view they are taking in not fully supporting research and publicity work.

Export Trade and the Home Market.

In electrical exports during 1927 Britain more than held her own, but up to the end of July this year she lost ground.

During the past year the electrical manufacturing industry has not generally been in a prosperous condition. In the keen competition to obtain work, prices have been lowered to an uneconomical level. The most dangerous handicaps with which the industry is saddled are: (1) Heavy burden of taxation levied by the Government and local authorities; (2) the inelastic banking systems; and (3) lack of protection. We cannot, through any action of our own, reduce tariffs in foreign countries, but we can insist on safeguarding Great Britain, and must not fail to profit by the lessons learned in those industries to which safeguarding has been applied. The main social objection to our present policy is one that cannot be easily overcome, namely, that the standards of living and of civilisation come down ultimately to the lowest existing in industrial countries competing with us. If some coal exporting country in Central Africa paying its workers fourpence a day were competing for coal shipments abroad, our coal industry also would need to come down to fourpence a day. The average Belgian wages are only 40 per cent. of ours, so that in order to merely beat Belgian imports on a price basis are we going to introduce Belgian standards of living?

British banks take no risks whatever; they allow the big industrial firm to do its own financing, especially in export trade, and force industrialists to take over duties which, properly, fall within the scope of banking; in other words, they pass on the risk. Banks have also a marked tendency to be persuaded by political and sentimental factors. The issue of foreign loans should be reduced as much as possible in this country, because they bring no advantages to the British industrialist and only make financial conditions more difficult here owing to the transfer of funds abroad; foreigners obtain their financial requirements in London to pay for contracts placed with foreign firms.

Standardisation.

Standardisation of voltages, periodicities, and other quantities will bring about economies, not only in the actual manufacture of electrical plant, but also in the following departments of any well-organised concern: (1) In the estimating and design offices; (2) in the preparation of drawings and specifications; and (3) in the sales department. More than 60 per cent. of the static transformers manufactured in this country are special as regards voltage ratios, impedances, and other details; even industrial motors, which are as completely standardised as any other piece of apparatus, include 20 per cent. of special machines. One manufacturer has found that the 20 per cent. specials require 60 per cent. of the total shop supervision, whereas the 80 per cent. standard units only require 40 per cent. of the supervision. Standardisation will also materially benefit the consumer of electricity, and has advantages in the domestic sphere.

National Electrification.

The effect of the Central Board's scheme on industry can be summarised briefly. The size of transformer now required for self-cooled units is a big step from that hitherto manufactured in this country: being so, the design is experimental, and drives the engineer to be liberal, and the possible use of excess material and so excess cost. Limitations to rail and road transport are a serious handicap, and the engineer may have to resort to uneconomical proportions of active material. In the future size must be limited, or the plant built on site.

Unless large units are ordered in sufficient numbers considerable expense in interest on capital, running costs, and floor space will be involved; the useful load factor of shop plant will be low, and to carry out tests to the full, extensive and expensive testing plant is necessary. For the most economical manufacture it may be necessary to call a halt, or by mutual arrangement fix on different sizes, so that the manufacturer's costs may be limited to reasonable proportions.

Differences of opinion about tap ratio changing under load are chiefly covered by the following:—*For*: (1) Lowest capital cost, (2) lowest weight and floor space, (3) fewer units and concentrated control, (4) most efficient. *Against*: (1) Untried in this country on such large units and voltage; (2) e.h.p. windings weakened by numerous tappings and a break in the windings; (3) impossibility of balancing the windings of all voltage ratios, thus causing weakness and possible heavy stresses on a fault; (4) complete shut down if tap-changing gear fails; (5) complication and congestion on e.h.p. units, thus presenting more possible weak points. This system of voltage control, which emanated from America, does not find favour on the Continent, especially in Germany.

New Electrical Devices, Fittings, and Plant.

Readers are invited to submit particulars of new or improved devices and apparatus for publication in this Section.

A Wall-Drilling Tool.

A useful tool recently introduced by Messrs. Wm. Geipel, Ltd., Vulcan Works, 156-170, Bermondsey Street, S.E.1, is the "Rapper" tool, fig. 1. It is intended primarily for making holes for the accommodation of wall plugs. It is compact, and weighs 1¼ lb. It works by an ingeniously designed combination of a drill, hammer head and a worm which raises and releases the hammer head, at the same time rotating the drill at uniform speed. By the use of a very stubborn spring moving through a short distance, blows

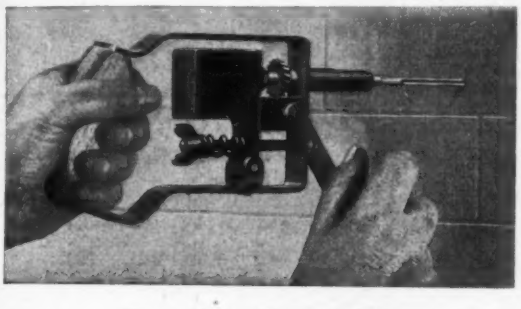


Fig. 1.—The "Rapper" Tool.

are imparted to the hammer head at a very high rate, equivalent, it is claimed, to blows of a hand hammer at the rate of 600 to 800 per minute. The weight of the blow is adjustable for various substances, and should be heavy for hard materials and gentle for friable ones. All wearing parts are made of special steel, suitably case-hardened, and are easily renewable.

Blue Automobile Lamps.

We learn that the General Electric Co., Ltd., Magnet House, Kingsway, W.C.2, is now marketing certain types of Osram automobile headlamps in natural blue glass. These are available in 24- and 36-W types, suitable for 6/7- or 12/14-volt lighting systems. It is claimed that many motorists find that these lamps, which filter the red rays from the driving beam, reduce the strain of night driving to a very great extent.

A Current and Polarity Indicator.

The accompanying illustration, fig. 2, shows a current and polarity indicator which has recently been introduced by Messrs. Philips Lamps, Ltd., 145, Charing Cross Road, W.C.2. It consists of a robust neon tube arranged in a neat bakelite case, with suitable electrodes, handles and a 2-ft. connecting lead for testing points on a circuit. A high resistance is used to provide against short-circuit. A "live" circuit is indi-

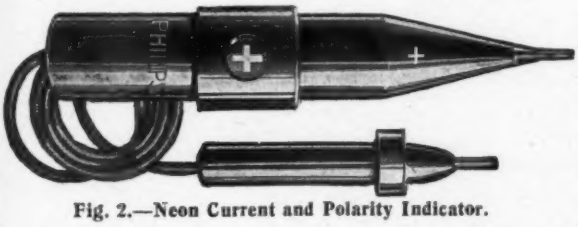


Fig. 2.—Neon Current and Polarity Indicator.

cated by a bright glow at the window of the instrument. The indicator can be used on any pressure up to 750 V, and a glow is produced on voltages above 110 a.c. and 150 d.c. As a pole indicator, the lamp glows when the electrode marked "+" is connected to the + pole of the circuit.

Book Conditioning Apparatus.

An interesting appliance recently introduced by the General Electric Co., Ltd., Magnet House, Kingsway, W.C.2, is a book-conditioning cabinet, the object of which is to provide manufacturers of books required by Government recording departments abroad with facilities for subjecting the books to the effects of heat and moisture for a number of weeks, so as to obtain conditions equivalent to temperature and atmospherical changes covering several years of storage in overseas climates. The first test for which this apparatus has been utilised is in connection with books for Indian Authorities. The apparatus comprises a metal chamber measuring 4 ft. by 3 ft. by 2 ft 6 in., amply lagged, and fitted with a plate-glass front and a plate-glass lid. The chamber is airtight. A rustless steel pan for containing water is placed at the bottom, where tubular elements, such as are used in "Magnet" baking ovens, are fitted. The temperature is limited to 130 deg. F.; thus a moist atmosphere is produced.

An Electric Washer and Boiler.

The "Blick," fig. 3, is an electric clothes and dish washer and boiler recently marketed by Messrs. W. H. Sugden & Co., Ltd., Glenny Road, Barking, Essex. It has a capacity for 14 gallons of water and is made of solid copper and nickel

Fig. 3.—The "Blick" Washer.

lined. It carries a 12-in. rubber wringer, and is supplied complete with 6 ft. of c.t.s. cable, and a pilot lamp and 3-heat switch mounted on a board. The maximum loading is 3 kW.

Automatic Valve-operating Unit.

A new type of automatic valve-operating device, intended primarily for use in chemical plant, has recently been produced by the Igranic Electric Co., Ltd., 149, Queen Victoria Street, E.C.4. The device, which can be used on all valves from 1 in. to 6 in. in diameter, has been applied successfully to all classes of valves for the automatic regulation of temperature and pressure of gases and liquids. Besides being controlled by push buttons, it can also be operated automatically by float switches, temperature-controlling devices or pressure regulators. Where push-button operation is desired, and where the valves are scattered throughout the shop, the push-button station for each can be located on a centralised control panel, so that all the valves are under the control of one operator. Reversing relays are embodied in the apparatus, and are mechanically interlocked to allow the unit to operate in any position. A limit switch of the travelling-nut type is also incorporated, and is adjustable up to 120 turns of the low-speed shaft. This shaft is driven through torque springs which provide a positive drive and also give a cushioning effect to protect the valve seat. Disengaging mechanism is provided for hand operation. The driving unit is a universal motor for either a.c. or d.c.

A New Printing Arc Lamp.

Messrs. Korting & Mathiesen Electrical, Ltd., 711, Fulham Road, London, S.W.6, have recently added to their range of arc lamps a new small copying lamp with a minimum rating of 5 A d.c. and 6 A a.c. This PVU lamp is strictly an enclosed carbon arc lamp, in which care is taken to prevent the access of air to the vicinity of the arc. In this way the entry of oxygen is prevented, and the arc therefore burns in an atmosphere of nitrogen and carbon monoxide. Under these conditions, and with a line pressure of 220 V, a 2- to 2½-in. arc can be set up with an arc voltage of 150-160. The light of the arc is claimed to be rich in chemical properties, being of an intense blue-violet colour of great actinic power. In addition to the visible actinic rays, the light has, it is claimed,

a high content of invisible rays of great actinic value. Fig. 4 shows the small type "Kandem" copying lamp fitted with a reflector for a horizontal printing frame, with matt or quartz glass globe. In this form the lamp is entirely surrounded by a deep bell-shaped reflector, so designed that all the light is thrown downwards and distributed evenly over the surface

Fig. 4.—The "Kandem" Copying Arc Lamp.

to be exposed, the copying frame being arranged horizontally. The lamp can either be permanently fixed or suspended from a counter-weight pulley, or any other device which permits the height of the lamp to be adjusted. In the latter case the height can be varied according to the dimensions of the print to be reproduced, so that all the light is fully utilised.

New Ceiling and Wall Attachments.

Recent introductions by the British Thomson-Houston Co., Ltd., include ceiling and wall attachments intended primarily for the display and demonstration of electric lighting fittings in showrooms. In each case the attachments consist of two interlocking parts, the first of which is permanently

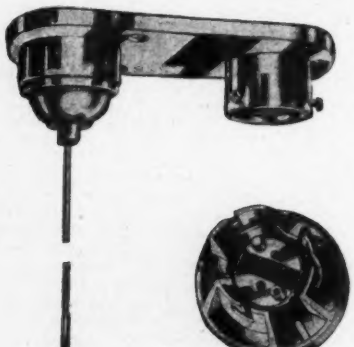


Fig. 5.—B.T.-H. Ceiling Attachment.

fixed and wired at the lighting point, while the second is attached to the ceiling plate or back plate of the fitting. The locking together of the two parts, as simple as the insertion of an electric lamp, enables the fitting to be firmly supported and the lighting circuit completed. The equally simple unlocking of the parts permits a fitting to be taken down instantly without the removal of screws or the disconnection of any wiring. The ceiling attachment also offers a solution to

Fig. 6.—B.T.-H. Wall Attachment.

the problem of cleaning fittings or replacing lamps in awkward situations in factories, shops, and so on; a spare fitting can be kept ready fitted with the detachable portion of the device. Some idea of the construction of these attachments, which are fully described in the B.T.-H. pamphlet L452, can be gathered from the accompanying illustrations, figs. 5 and 6.

Railway Electrification.

Recommended Standards for British Railways.

LAST week the report of the Railway Electrification Committee appointed by the Minister of Transport on November 11th, 1927, was issued (H.M. Stationery Office, price 6s. 6d. net). The terms of reference were: "To review the recommendations made by the Electrification of Railways Advisory Committee, 1921, and to report what modifications, if any, should be made in these recommendations, having regard to the developments which have taken place since that date." The chairman was Col. Sir John W. Pringle, C.B., chief inspecting officer of railways, Ministry of Transport, and the other members were Sir John A. F. Aspinall, Mr. A. R. Cooper, Lt.-Col. F. A. Cortez Leigh, Sir Philip Dawson, Sir Alexander Gibb, Mr. H. N. Gresley, Mr. H. Jones, Mr. C. H. Merz, Sir Philip Nash, Mr. Roger T. Smith, and Sir John Snell.

The report states that during the past seven years 445 miles of single-track railway has been electrified on the d.c. system, at 600-650 volts, of which 408 miles belongs to the Southern Railway. The total single-track mileage of electrified railway in this country is 1,257 miles at low voltage and 77 miles at high voltage, d.c., and 151 miles a.c.—total, 1,485 miles; but the Southern Railway has decided to substitute low-voltage d.c. for the whole of the existing single-phase a.c. railway on its system, amounting to 132 miles, and to convert 15 miles now worked by steam, thereby bringing the total mileage up to 1,500 miles, single-track, by the end of March, 1929.

The Committee recommends that direct current be used on all future electrification, the maximum standard voltages at sub-station bus-bars being either 1,500 or 750 volts; but the use of a pressure of 3,000 V with the consent of the Minister of Transport is not excluded. For transmission to sub-stations three-phase current at 50 cycles is recommended. For the higher line voltage overhead collection is preferred, and for the lower voltage third-rail collection, with uninsulated rail return in both cases (though the use of an insulated fourth rail is approved for tube railways, and for limited extensions of existing systems which use an insulated return). Under contact with the overhead conductor, and top contact with the rail conductor, are recommended.

It is not considered necessary to provide for inter-running by multiple-unit stock between higher and lower voltage systems, but maximum loading gauges for electric locomotives to permit of inter-running have been prepared; of these No. 1, with a maximum height of 12 ft. 8 in. above rail level, allows of inter-running over all British railways (except 264 route miles), a total of 19,952 route miles, and No. 2, with a maximum height of 13 ft. 2 in., gives a scope of operation over 13,327 route miles. Maps of the London area, England and Wales, and Scotland are attached to the report, showing the three categories of railways. A drawing of the profile proposed for the overhead current collector for all future electric locomotives is given. In order to provide for inter-running most economically, it is suggested that in the first instance low-voltage motors be installed, with provision for working them in series-pairs when running on high-voltage lines, bow collectors and shoes being provided on all locomotives intended for inter-running; but as it may be many years before inter-running is necessary, the Committee considers that this question may be shelved until, in the case of each railway company, one-third of its locomotives have been replaced by electric locomotives, sufficient interchangeability in the interim being provided by change of locomotives.

Referring to the question of electrolysis, and/or fusion of gas and water pipes, &c., the Committee points out that railway companies have their own right-of-way, and, unlike tramways, their rails are laid on sleepers and ballast, and have a much higher resistance to earth. The pipes and cables of outside parties are further from the tracks than those belonging to the railway companies themselves, which, in their own interests, can be relied upon to take all reasonable precautions. Moreover, the Minister of Transport desires "that railway electrification schemes should not be unduly hampered or rendered economically impracticable by regulations of too stringent a character." As the Committee considers that any limitation of the drop of potential in the uninsulated return would tend to prevent extensions of electrification, and that electrolysis and inductive interference may be due to causes other than drop of potential, it supports the view of the Committee of 1921, that regulations limiting the drop of potential in the return are undesirable. Nevertheless, regulations designed to limit the resistance of joints in the return rail conductors are suggested, and it is recommended that the negative bus-bars shall not be earthed, that the return circuit shall be electrically separated (so far as railway construction will reasonably permit) from the general body of the earth, and that the d.c. supply shall be free from tooth ripples to the extent prescribed by the B.E.S.A. specifications. These rules were discussed with representatives of the General Post Office, who thought they did not go far enough in the direction of limiting the drop of potential, and Col. T. F. Purves, engineer-in-chief, proposed that a joint investigation should be carried out.

Reviews.

Alternating-current Machinery. By R. E. Brown. Pp. xi+274; figs. 166. London: Chapman & Hall, Ltd. Price 15s. net.

The sub-title of this book is "A text-book on the theory and performance of generators and motors," and its author belongs to the Moore School of Electrical Engineering, University of Pennsylvania. The purpose of the book is to provide a text-book on the principles of alternating-current machinery which thoroughly treats the subject, while it is intended for students who already have a good training in the principles of alternating-current circuits. After an introductory chapter on alternating-current theory, there follow three chapters on the construction, theory, and applications of the transformer. Synchronous machines are covered in chapters on the generator and its operation, alternators in parallel, the synchronous motor and its operation. Under rectification there is a chapter on the synchronous convertor and a very brief chapter on mercury-vapour, mechanical and thermionic rectifiers. Coming to induction machines, chapters are devoted to the polyphase induction motor; to the analysis of its performance, and to the circle diagram; starting, speed control and power-factor correction; induction generator, phase convertor, synchronous-induction motor, frequency changers; single-phase induction motor. The concluding chapters deal with phase balancers, measuring instruments, and machinery laboratory problems.

We have given a list of the contents in this way because we think that it will create the same kind of feeling in the reader's mind as in the reviewer's. How is it possible to treat thoroughly in the space of 274 pages so many types of alternating-current machines, when each type alone could well fill the whole without irrelevant or superfluous matter? Surely transformers, synchronous machines, induction motors, and converting machinery—when carried beyond the technology stage—each deserves a treatise for itself, and it is this fact which makes it hard for us to place the present book. On the one hand, the treatment is too advanced for the beginner and too superficial for the reader who has got beyond the usual course in electrical technology. Possibly mechanical or civil engineers who have to deal largely with electrical machinery may find a book of this character useful, but for the electrical engineer we do not find it fills any conspicuous gap in available literature.

At the end of the several chapters are examples. These are largely numerical and there is a good assortment. These examples, together with the machinery laboratory problems, are better suited to the electrical engineer. The only fault we have to find with the book is the great brevity of many of the sections, but beyond this comment we have no adverse criticism to make. What we are given is good and we may be excused for asking for more.

The Installation of Electric Lighting and Heating. By Frederic H. Taylor, A.M.I.E.E., A.M.I.Mech.E. Pp. ix+149; figs. 154. London: Chapman & Hall, Ltd. Price 7s. 6d. net.

This book deals with the principles and practice of electrical installation work, with particular reference to the domestic field. It is apparently intended for apprentices and junior students who have little acquaintance with electrical technology. Whilst due attention is given to the explanation of elementary electrical calculations with the aid of worked numerical examples, the general tone of the book is practical and descriptive.

In the first section of the book the author outlines the leading characteristics of cables used for domestic wiring, and deals with the choice of cross-section as governed by current-carrying capacity and permissible voltage drop. A subsequent section deals very ably and fully with the various systems of wiring now in use. We note that the author, in dealing with the necessity of bunching conductors carrying a.c. in steel conduit, gives as the necessity for this the inductive drop which occurs in a single conductor surrounded by a steel conduit. The more important matter of the heating of the conduit by the circulation of parasitic currents should have been referred to. The author amply stresses the necessity of efficient earthing of conduits and other metallic sheathings of insulated wires. The use of a pipe earth as an alternative to the earth plate might have been mentioned, for circumstances where a water-main connection is not possible. Several tests for the continuity of steel-conduit systems are given, but none is as good as that devised by Mr. Wilkinson, in which the run of conduit and a standard 2-ohm resistance are successively connected in circuit with an ammeter and a dry battery, when the instrument readings give an immediate indication as to whether the conduit resistance is within the prescribed upper limit. Dealing with the various metal-cased systems of wiring, we note that no reference is made to the porcelain conical screw connectors which are now coming into such general use. A useful feature of the section under consideration is the collection of notes on wiring for abnormal or difficult situations, although we can hardly agree with the author in his implied preference for a solid laid cable for underground installation, as compared with an armoured cable laid direct in the ground.

Simple wiring circuits are illustrated by well-executed drawings. The descriptive matter relating to lamps, switches, fuses, and other accessories is good and useful; whilst sufficient, but not undue space is given to the matter of special switch controls.

Good practical directions are given for installation testing, although the elementary simple precaution of testing the leads for continuity before using a Megger might have been included. In measuring voltage drop, we should have preferred to have obtained a direct reading of this drop, rather than to have deduced it from the difference of two readings according to the method shown in fig. 152. There is a short chapter on planning an installation, a few notes on wiring and accessories for domestic heating circuits, whilst a selection of tables from the Wiring Regulations of the I.E.E. are included as an appendix.

The book has been attractively produced, and it can be recommended for the class of reader for which it has been written.

Aufbau und Entwicklungsmöglichkeiten der europäischen Elektrizitätswirtschaft. Pp. 530; illustrated. Berlin: The Economic Section of the Banking Firm of Schwarz, Goldschmidt & Co.

It is a striking indication of the high position electricity supply undertakings now occupy in financial circles that a private banking concern such as is the firm of Schwarz, Goldschmidt and Co., of Berlin, should go to the expense of compiling and issuing a comprehensive book on the present position and possibilities of development of electricity supply in Europe. The work before us is printed in German and is typical of that thoroughness which pervades German technical literature, so much so that anyone who is interested in the question of electrical progress on the Continent will probably find within its pages all the information he desires.

As one of the most highly-developed countries from the electrical point of view, it is only natural that the major portion of the work deals with the present electrical position and future possibilities in Germany. This section, which has been compiled by Prof. Dr. Walther Windel, of the Berlin Technical High School, extends to over 200 pages and treats the subject of comparative generation costs in steam-operated and hydro-electric plants very exhaustively. The various other sources of power—peat, wood, oil shales, natural gas, wind power, and even that of the tides—are all discussed, and details given of the installation of all existing electricity generating stations and their output in recent years, and the areas to which they supply power, illustrations being given of the more important plants.

Dipl. Ing. Carl Th. Kromer, of the Rheinfelden-Baden Power Transmission Works Co., deals in a similar exhaustive manner with the progress made in all the other principal countries of the Continent. Section III of the work treats of the financial side of the industry and epitomises the capital invested in it, this being followed by an analysis of the financial position of the principal electric supply and electrical engineering concerns in all the different countries, up to the end of 1927. This, we gather, is the main purpose of the banking firm responsible for the issue of the book, for, from it, anyone interested in the shares of any Continental electrical concern is able to obtain particulars of the financial position and the dividends paid in recent years, a very complete index enabling the reference to any particular company to be quickly turned to.

It may be noted, in conclusion, that the work only deals with Continental Europe, no details, apart from a reference to the Shannon plant, being included anent electricity supply undertakings in the United Kingdom.

Insulation Testing. Pp. 68; figs. 36. London: Messrs. Evershed & Vignoles, Ltd.

As is the case with another book on insulation testing recently issued by Messrs. Evershed & Vignoles (Electrical Review, September 21st, 1928, p. 500), there is in this work an attempt to create in the mind of the tester the meaning of the tests he is carrying out. There is a separate chapter devoted to "Tests and their Interpretation." A particularly useful section of the book deals with practical applications of insulation testing, including generators, motors, transformers, and switchgear; wiring installations; power lines and cables; h.p. insulators; and telegraph and telephone cables. This section should serve as a useful guide in the choice of the testing instruments. A summary of the insulation requirements of the B.E.S.A. specifications is given for such apparatus as generators, motors, control and switchgear, and so on. Special information contained in the pages on the drying-out of transformers and machine temperatures, in relation to the testing operations, raises the work above that usually obtaining in ordinary text books. Brief descriptions are given of instruments available for insulation testing, and although reference is made to the products of the publishers, the work cannot be classed with the usual advertising matter.

British Engineering Standards Association.

Proceedings at the Annual General Meeting.

SOME interesting facts in relation to the present position of British engineering and international standardisation were expounded at the tenth annual general meeting of the Association in London on October 16th, under the chairmanship of Mr. Maurice Wilson.

Over 100 new and revised specifications have been issued by the Association, and over 90,000 British Standard Specifications have been sold. There are over 500 Committees and 2,700 engineers and business men throughout the country giving their time and energy to this work; there were actually 568 meetings last year. The Association has lodged a petition with the Privy Council for a Royal Charter, with the full support of the leading technical institutions.

Re-organisation, which has been under consideration during the past year, is gradually maturing, and will mean considerable simplification and decentralisation so far as the new Council, to which all the members will have the opportunity to elect members, is concerned.

Reference was made to the Committee on Simplification and Standardisation of the Board of Trade, and the hope that the Government would at no distant date call an Imperial Conference on Standardisation, as the necessity was felt for immediate action with a view to harmonising the work of the British Engineering Standards Association and that of similar organisations in the Dominions, particularly Australia.

Probably the most important piece of work undertaken recently has been the preparation of standard methods for the commercial analysis and sampling of coal. In this work the Association has the cordial support and assistance of the Fuel Research Board of the Department of Scientific and Industrial Research, as well as of all branches of the coal industry. Whilst approved methods of analysis may not be so difficult to arrive at, there is no doubt that to set up standards for sampling coal presents immense difficulties, and it is probable that agreement will have to be reached along more or less conventional lines.

The chairman made interesting reference to the assistance which the B.E.A.M.A. had given the work of standardisation through its trade standardising bodies, whereby it had been able to give the B.E.S.A. Committees the consensus of views of the electrical industry as a whole and assist the B.E.S.A. to come to decisions of value to all concerned.

As in previous years, both the electrical and automobile industries appeared to be making tremendous strides in standardisation. The former had been standardising under the aegis of the B.E.A.M.A. for the past twenty years, and it is acknowledged on all hands that the British Standard Specifications for electrical machinery and apparatus have been of the utmost value in the electrical trade.

Attention was drawn in the report to the fact that international standardisation, apart from electrotechnics, had been considered during the past two years. The main Committee, desiring to go only so far as British industry as a whole felt to be wise, authorised the calling of a number of conferences so that before taking a final decision in the matter it might be fully informed as to the views of industry on the international proposals. The result of those conferences showed definitely that British industry was not favourable to any general movement towards international standardisation in mechanical subjects, at any rate on the lines suggested by Continental friends, though it appeared to be decidedly in favour of Imperial standardisation.

At a special meeting on March 21st, 1928, the main Committee, after very fully reviewing all the facts before it, came to the definite decision to disassociate the B.E.S.A. from any further endeavour towards the formation of an International Federation of the National Standardising Bodies. In coming to this decision, it felt that whilst international standardisation might lead to reduction in costs of production in many cases, questions of tariffs and differing systems of measurement, together with the lack of complete American co-operation, precluded any hope of carrying the scheme forward successfully. Nevertheless, the direct and friendly relations already existing between the national standardising bodies will be maintained, and will enable any specific subject upon which agreement may be thought helpful to international trade to be discussed by a committee representing those countries desiring to take part, the initiating country acting as secretariat. Should British industry be fully in favour of co-operating, the B.E.S.A. would do its best to promote agreement.

Mr. Ll. B. Atkinson, chairman of the Finance Committee of the B.E.S.A., said that he felt sure that the enormous amount of time and energy put into the work by the 2,700 honorary members, technical experts, and business people up and down the country, who gave their time and experience to the preparation of British Standard Specifications, was not realised by the industry as a whole. If it was, the B.E.S.A. would not every year have to record a large deficit; this year it was £1,800 down, and it was hoped that that sum would soon be made up.

Mr. Maurice Wilson, the new chairman of the Association, said that if industry realised that in its midst there was this independent and impartial organisation, ready to carry out its behests, it would make much more use of it than it did.

Legal.

The Marconi Licence Appeal.

The Brownie Wireless Co. of Great Britain, Ltd., who are respondents to a pending appeal by Marconi's Wireless Telegraph Co., Ltd., were plaintiffs in a summons before Mr. Justice Tomlin, in the Chancery Division on November 6th, by which they asked for leave to call further evidence on the hearing of the appeal; for inspection of agreements between the Marconi Co. and the Radio Corporation of America, the Gesellschaft Drahtlose Telegraphie m.b.H., of Berlin, and the General Electric Co. of America; and for the production of typical specimens of the broadcasting licences granted by the Marconi Co. under its wireless patents, including those granted to the Marconiphone Co. and the Metropolitan-Vickers Co. The appeal, which is to be heard by Mr. Justice Tomlin on a date to be fixed, so that the Attorney-General may be present, is from the decision of the Comptroller of Patents, who held that the refusal of the Marconi Co. to grant a licence to the Brownie Co. on reasonable terms was an abuse of its monopoly rights.

Mr. Rudolph Moritz, K.C., for the Brownie Co., said that the Comptroller proposed to grant compulsory licences. The only witness at the hearing before the Comptroller, apart from Mr. Gill, was Mr. Isaac Schonberg, joint general manager of the Marconi Co. He dealt with the allegation that the following condition in the licences they offered was unreasonable, *viz.*, that there must be included a clause that licensees should not export anything manufactured according to the patent. He defended the clause, saying that certain working arrangements had been entered into with the foreign corporations mentioned which were of such a character that they were bound to include the clause, otherwise they might be held liable for breach of contract. Obviously it was important that his clients should have an opportunity to examine this document, because it seemed strange that in a country like this licensees should be prohibited from exporting.

His Lordship pointed out that in countries where patents were in force importation would be infringement.

Mr. Moritz said that the whole matter was completely obscured. The Marconi Co. said that 2,000 licences had been granted in this country, but admitted that there were one or two companies which had received licences on more favourable terms. At the Patent Office hearing Mr. Schonberg maintained that the rest of the wireless trade was satisfied with the general licence, but evidence from the secretary of the trade association showed that there was very grave dissatisfaction. He wanted to call evidence to show that the licence was forced on the trade.

On behalf of the Marconi Co., Mr. J. Whitehead, K.C., contended that no facts at all were disclosed to show that there had been any abuse of monopoly rights. When Mr. Moritz, before the Comptroller, demanded the production of the agreements with the foreign companies, he (Mr. Whitehead) said that he had not got the permission of the other parties to them to produce them. He was willing, however, to allow Mr. Moritz to inspect them under proper safeguards. The real finding of the Comptroller was that, inasmuch as the Brownie Co. wanted to extend its trade by exporting infringing articles, the Marconi Co. said they could not have any licence but that granted to others, and that was held to be an abuse. The reason why certain companies were specially favoured was because they provided the capital to establish the Broadcasting Co.

Giving judgment, his Lordship said that as Mr. Whitehead said he was not going to rely, on appeal, on the paragraph in Mr. Schonberg's declaration relating to the question of export, he would make no order on that part of the summons. Also, as Mr. Whitehead had offered inspection of three of the favoured class of licences, there would be no order on that part of the summons either. As to the question of calling further evidence, he could see no reason for that, and made no order; in fact, he made no order at all on the summons, except that the costs of the application would be costs in the petition. His Lordship added that at the hearing of the petition he would reserve his right to take any step he thought necessary to call for any document which he considered would help in determining the rights of the parties.

Commissioners of Inland Revenue v. British Insulated Cables, Ltd.

Lords Buckmaster, Sumner, Wrenbury, Carson and Warrington on Friday reserved judgment, without calling on respondents' Counsel, in the House of Lords in this case. The question which arose in the appeal was in relation to assessments to corporation profits tax made by the revenue authorities upon the company, the point for decision being whether the profits of the company were assessable to the tax, or whether they were not so assessable by reason of the fact that the company carries on an electricity undertaking in addition to its other operations which is subject to Acts of Parliament restricting the amount to be charged for electricity. The Special Income Tax Commissioners decided that in accordance with the provisions of Section 52 of the Finance Act, 1920, the company was entirely exempt from the tax, a decision affirmed by Mr. Justice Rowlatt and upheld by the Court of Appeal. The

revenue authorities appealed to the House of Lords. The Attorney-General (Sir Thos. Inskip, K.C.) and Mr. Reginald Hills submitted that these adverse decisions were wrong and should be reversed as the electricity undertaking represented only an infinitesimal proportion of the business.

The Attorney-General drew attention to the fact that in the year 1920 the total sales of electricity amounted to £50,000, of which £8,000 represented sales to outside consumers and £41,847 sales to the company's own works. In the same year the total sales of the company (other than sales of electricity) amounted to £5,398,471. For the period 1920 to 1924 the proportion of the receipts by the company from consumers of electricity, including the company itself, to the total sales of the entire business of the company, was 1.141 per cent., and a similar proportion of receipts from outside consumers only was 0.24 per cent.

Bogus Canvassers Sentenced.

FOR obtaining money by false pretences Nahum Bellfield (53), and Wm. Waters (43) were sentenced to six months' hard labour and three months in the second division, respectively, at Leeds last week. It was stated that men called on householders said they were from the Leeds Corporation Electricity Department. They solicited orders for the installation of electric light. A witness said that defendants told her they had received several orders, including one from a neighbour of hers. She agreed to have six lights put in, at a cost of £4 10s., and, at Bellfield's request, paid a deposit of £1, for which he gave her a receipt. Later she became suspicious and communicated with the police. The men had nothing to do with the Department, and had no authority to canvass for orders.

Theft of Electricity.

AT Dundee, on November 9th, Charles S. Jarvis, electrician, Dundee, was charged with having, between April 2nd and June 24th, broken into premises in Dundee, occupied by a joiner, and stolen one unit of electricity. An agent, on behalf of respondent, said that Jarvis was prepared to plead "guilty" to a simple charge of theft without the aggravation of housebreaking, and the prosecutor accepted this modified plea.

The agent explained that Jarvis was an electrician and radio engineer in Dundee. During the last two or three years he had not possessed a workshop, and the joiner had allowed him to use a store to keep goods in. Respondent was asked by a customer to charge an accumulator. He had no electricity in his own house, and as he could not get the accumulator charged elsewhere he decided to charge it in the joiner's place. For that purpose he connected two wires to the main Corporation fuses and to a charging board. The amount of electricity used was about a quarter of a unit, valued at about a penny. By this method the respondent used the electricity belonging to the Corporation without its passing through the meter in the ordinary way.

The SHERIFF said that it was a very deliberately conceived type of theft, and there was nothing to be said in defence of it. A fine of £2, or 20 days' imprisonment, was imposed.

Parliamentary News.

[By Our Special Parliamentary Reporter.]

Opening of Parliament.

The fifth and final Session of the present Parliament was opened by the King on November 6th. The Speech from the Throne foreshadowed that the chief business of the Session will be rating reform and finance.

Television.

On November 8th, in reply to questions by Lieut.-Commander KENWORTHY, Sir W. Mitchell-Thomson (Postmaster-General) said that he knew of no system which was at present capable of transmitting moving pictures of actual events for satisfactory reception by wireless listeners. He had not refused permission for the use of the British Broadcasting Corporation's stations for television tests. The Governors of the Corporation decided, in the exercise of the discretion vested in them, after a demonstration by the Baird Company which held an experimental licence, that the system did not at present fulfil the conditions which would justify a public trial through one of their stations. He had recently received an application from the Baird Company for further facilities. That application was at present under consideration.

Gas Industry Restrictions.

On November 8th, in the House of Lords, Lord ASTOR drew the attention of the Government to the difficulties under which the gas industry was working, largely due to the effect of certain restrictions contained in Acts of Parliament passed in 1847, 1859, and 1871. Since then conditions had entirely altered. He did not ask for preferential treatment, but only that the gas industry should not be subjected to antiquated restrictions which did not apply to electricity.

Lord PLYMOUTH, replying for the Government, said that there was no reason to suppose that the gas industry would not expand as it had done in the past. The competition of electricity had proved a great incentive and spur to efficiency. The Government believed that there was ample room for both industries. The Board of Trade had had the matter raised under consideration, and a sub-committee of National Fuel and Power Committee had considered it, and had obtained the views of all the interests concerned. Its report was practically complete, and would soon be in the hands of the President of the Board of Trade. He could hold out no hope, however, of legislation this Session.

A similar question was asked in the House of Commons by Viscountess Astor, and replied to in similar terms by the President of the Board of Trade.

Gas Lighting in Trains.

Colonel ENGLAND asked the Minister of Transport whether his attention had been called to the existing and continuing use of gas lighting in railway trains; whether he had made any representations to the railway companies that an electric lighting system should be substituted; and, if so, with what result?

Colonel ASHLEY said he was aware that a considerable proportion of railway carriages were still lit by gas. The Board of Trade and the Ministry of Transport had taken the view that the use of electricity for this purpose was desirable in the case of all new and reconstructed passenger stock, and the companies as a rule had in recent years ceased to fit ordinary passenger carriages with gas lighting equipment, with the result that a gradual substitution of electricity for gas was taking place. The attention of the companies had also from time to time been drawn to the desirability of using electricity instead of gas, more particularly on main-line and express trains, but the risks arising from the use of gas had not been held to warrant its absolute prohibition as an illuminant in railway carriages.

Correspondence.

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession.

Pulverised-fuel Plant at Liverpool.

Referring to the report of the proceedings of the World Conference on page 773 of your issue of November 2nd, I would point out that Mr. F. D. Napier, in correcting a statement made by Mr. Rosencrants, stated that the Liverpool power station was not using the bin and feeder system, but the Fuller-Bonnot direct system.

This correction of Mr. Napier's is, however, still incorrect. The three new boilers now being installed are being built by Messrs. Babcock & Wilcox; the combustion chambers are entirely lined with water tubes protected by Bailey blocks, fired by means of Calumet burners, the pulverising being carried out by means of Atritors manufactured by Messrs. Alfred Herbert & Co. Messrs. Babcock & Wilcox are the main contractors for this installation, in which they have collaborated with their associated American company, the Fuller Lehigh Co.

P. J. Robinson,
City Electrical Engineer.

Liverpool, *November 7th*, 1928.

The Fuel Conference: a Correction.

In your issue of November 2nd, which contains an article reporting the Fuel Conference, you quote from a statement by Mr. J. C. Twinberrow. Part of this statement is as follows:—

"He made reference to the speed with which pulverised-fuel boilers at the Southern California Edison 'Long Beach 2' station and at the Richmond (Philadelphia) station could be brought on to the line; they had been standing up to the most severe conditions."

I would call your attention to the fact that the "Long Beach" station of the Southern California Edison is oil-fired entirely, and the Richmond station of the Philadelphia Electric Co. is completely equipped with Taylor underfeed stokers.

Consequently, the above statement is extremely misleading, and we, as the manufacturers of the Taylor stoker, who are very proud of the very high record of efficiency that is obtained at the Richmond station, this efficiency over a period of two years having been 87.6 per cent., including all banking and other stoppages, think that this statement in your paper should be corrected.

American Engineering Company,
E. J. HUSTED.

London, *November 7th*, 1928.

X-Ray Tube Contracts.

We notice that the Director of Army Contracts is calling for tenders for Dutch-made X-ray tubes for military requirements, whereas English-made X-ray tubes are available at a lower price and of equal capacity.

During the war the Army Medical Department was put to very great inconvenience by being forced to use the old type of gas tube instead of the hot-cathode X-ray tube because it was not considered expedient to rely on an oversea source of supply (United States of America). Since that date the British Thomson-Houston Co., of Rugby, at very great expense, has laid down the necessary plant for the manufacture of these tubes in this country, and we feel that this enterprise should have, at any rate, the support of our Government Departments in order that we may not find ourselves in the same unsatisfactory position as prevailed during the Great War.

On the Government tender form we note that a special notice is affixed relating to the relief of unemployment, and also there is a clause in which considerable emphasis is shown directing attention to a resolution of both Houses of Parliament, February 16th, 1926: "That in the opinion of this House it is the duty of the Government in all Government contracts to make provision for the employment to the fullest possible extent of disabled ex-Service men, and to this end to confine such contracts, save in exceptional circumstances, to employers enrolled on the King's National Roll."

The Medical Supply Association, Ltd.,
(F. W. Read, *Director.*)

London, *November 7th*, 1928.

Does it Pay to Acquire Knowledge?

May a voice from "darkest Africa's silent bush" crave a few lines of your space? I have been interested by several letters in your September issues on "Does it pay to Acquire Knowledge?" By the same mail comes the news in the lay Press of a man having won £20,000 and of two others having won £10,000 each in a football competition. Ye gods! My advice to "Ambitious" and "Interested" is to study football. I agree with "P.M." (September 21st issue). They might possibly earn more with a few hours' study of football form than they can hope to earn in a lifetime at "Engineering."

Coaster.

W. Africa, *October 23rd*, 1928.

Electromagnetic Forces.

I would willingly have allowed this discussion to conclude with the letter from Mr. E. B. Wedmore and Mr. H. Trencham in your issue of November 9th, if they had not therein made the entirely incorrect statement that I have shifted my ground. I have never referred to any but one of their rules, namely, the one saying that the force between two parallel conductors is $9\ (1/10{,}000)^2(b/h)$ pounds, when 1 is the d.c. (amperes) in each conductor, b is the length of each, and h is the distance between them, supposing that the conductors are directly opposite each other.

Apparently they now agree with my contention that this rule gives ten, or more, times the actual force in cases that frequently arise in practice; that it will therefore still be a very bad rule if the 9 is changed to 4½, and that the correct result can be obtained in all cases from my rule that says the force is $4.5\ (1/10{,}000)^2\ (\sqrt{(b/h)^2+1}-1)$ pounds.

I have no doubt that, as they suggest, the principle upon which my rule is founded was known to them before they read my article. They and I have merely been making mathematical deductions from a well-known fundamental principle, and all I claim is that my deductions are sound and useful, while theirs (like those of Ludwig Kopec and the American *Standard Handbook*) are fallacious and misleading.

W. F. Dunton.

Manchester, *November 9th*, 1928.

Foreign Contracts.

With some diffidence I write to comment on a point in the letter by Mr. Thomas Bolton to the Postmaster-General, reproduced in your issue of October 12th last, page 627.

He refers to the unemployment caused by the sending abroad of the order for copper wire in such a way, it seems to me, as to suggest that there is a net loss of employment to the country in general equal to what labour would have been required in making the wire. I hope I am clear; if not, perhaps another case, in which figures are given, may help.

In a supplement to the *Daily Telegraph* last July, Sir Henry Page Croft sums up the number of workmen in five leading trades who would have been employed in making the goods in those trades now bought from abroad as 500,000, and argues calmly that the making at home of those goods would give 500,000 men more work.

Now it seems to me that a fundamental fallacy exists here. What left this country to pay for those goods? Did they come for nothing? Must not a similar number of people be employed here to-day making the goods which *must* be sent out to pay for them, not necessarily to the same countries directly, but to somewhere or other?

Mr. Bolton and Sir Henry Page Croft, in implying that the number of men put into employment in some particular trade by the shutting out of foreign imports in that trade is a net gain, not counterbalanced by a lack of work in the trades (diffused over the whole country, perhaps) which sent goods abroad to pay for the imports, seemed to me to be in an utterly untenable position, and nothing has caused me more to suspect the case for "safeguarding" than the constant use of this kind of argument, a denial of the whole basis of international trade. Were this reasoning sound, the immediate and happy abolition of unemployment would be simplicity itself!

I am not commenting on the particular matter which has caused controversy between Mr. Bolton and the Post Office.

A. O. Griffiths.

Caergwrle, nr. Wrexham, *November 4th*, 1928.

Why Progress is Slower than it should be.

Engineers and others are often asked what is wrong with the electrical industry, and with their own knowledge of its expanding activities find it difficult to formulate an answer. Yet expansion, particularly in the domestic field, is not so rapid as it might be, and the following true story may provide some Sherlock Holmes with a clue as to the cause.

Recently my wife saw a vacuum cleaner demonstrated by a well-known firm, whose British works are familiar. In due course a vacuum cleaner appeared in the home and a cheque of £15 passed over. Judge my surprise upon discovering the machine to be labelled "Made in U.S.A." and even packed in American newspapers! Further, judge my irritation upon finding in the American packing a "pull" of an advertisement, with illustration, offering the identical machine under another name at $44.75, or roughly £8 19s.—some 40 per cent. less than I paid for it!

When I add that the cleaner is operating on energy at 8d. per kWh, though less than 10 miles from your offices, I think the reason for the relatively slow progress of domestic electricity is revealed. If I went to the expense of separate wiring I could run the cleaner (and do all my cooking) at 4d. a unit, if I *chose*.

Arad.

London, *November 5th*, 1928.

Replacement of Apparatus on Changing-over.

Mr. Eric Jackson's article in your issue of October 12th and Mr. H. M. Sayers's letter in reply are especially interesting at the present time, and a definite ruling on the whole matter would be welcome from the authorities concerned.

It would seem that Section 18 of the 1882 Act, where it says "The undertakers shall not prescribe . . . nor in any way control or interfere with, the manner in which electricity supplied by them is . . . used," definitely entitles a consumer to connect radio apparatus to his supply mains. Many undertakers state in their regulations that a consumer, upon taking a supply and declaring his requirements, is not to add to his installation, or make any alterations, without notice and consent; upon that stipulation they would like to safeguard themselves from the cost of replacement. However, few of the Provisional Orders under which they supply give them the statutory power to enforce such a regulation, and I venture to suggest that it would not be upheld in the Courts, provided that such additional apparatus was connected to the lighting circuit in respect of which the maximum charge is operative. If the apparatus were connected to a power circuit, the position might very well be altered, as the rate in that case is a reduced one for a particular use.

The authority to convert a system is almost invariably obtained from the Electricity Commissioners under B3 and B4 of the Regulations for ensuring a proper and sufficient supply of electrical energy, and the advertised notice provides that the undertakers will . . . "carry out the necessary alterations to consumers' existing apparatus . . . or pay to each consumer injuriously affected by the alterations such a sum as may be agreed upon . . . or in default of agreement by arbitration." It is not usual for such a notice to include any clause safeguarding the undertaker from liability to replace apparatus installed after the posting of the notice, although the word "existing" apparatus may cover this contingency.

In view of the fact that the conversion of a system is for the benefit of the undertaker (and, if a municipal one, for the benefit of the ratepayers) it is only equitable that the consumer should bear no cost whatever by reason of the change-over.

The Factories Act stipulates the use of insulated switches and lampholders where alternating current at the usual potential is used in places with stone or concrete floors, and the private consumer may contend that the fittings which are only considered safe for workers and provided for by legislation should equally be installed in his bathroom, scullery, &c. Indeed, it is a necessary safeguard in view of the condition of many of the existing fittings which one finds. Now this "apparatus" is not necessary in the sense that the existing fittings will not work with alternating current, but the words "necessary alterations" are not defined in the notice of the change-over. Some undertakers put this onus on the consumer, whilst others take the more equitable view and replace such fittings. Whilst it would seem that there is no legal obligation for the undertakers to bear this cost, or the Commissioners to impose it, it would be interesting to

learn from a legal authority whether there might not be an implied liability if the consumer, for purposes of insurance, had previously had his installation wired in accordance with the I.E.E. Regulations for direct current.

A large number of consumers are now charging their radio accumulators from their domestic supply mains. Where a small motor-generator, or a charging board employing a resistance purely for that purpose, is installed, it is submitted that the apparatus should be replaced without cost to the consumer. However, many consumers have been to no extra expense and bring in no additional revenue to the supplier, by charging their accumulators either in series with their house-lighting points, or in series with a radiator. It would seem that in cases of this sort there should be no obligation on the part of the supplier, especially in the latter case, in which the rate is for a definite purpose and was accepted as such.

D. Ripley.

London, *November 5th*, 1928.

Foreign Agencies.

When appointing foreign agents the question whether a firm can store and handle the material in a satisfactory manner is often overlooked.

The writer knows of many cases in the East where firms with excellent connections are appointed agents, but their godown accommodation and staff are not suitable for handling heavy machinery.

The question whether a firm has a suitable showroom is also forgotten. The office may be quite well situated, but if it is on the second or third floor and there is no method of getting heavy samples up it is useless.

Perhaps this information will be of assistance to your readers.

Eastern.

A Lapsus Literæ.

On page 824 of the current issue of the ELECTRICAL REVIEW you show a 500-watt neon domestic indicator. I have been looking for this thing for years; in fact, I am going to-morrow to buy six to heat my house with. A lamp with an efficiency of .0005 c.p. per watt is hardly suitable for pilot lights; personally I use arc lamps for this. No doubt there is a mistake somewhere. I write this in great haste *before* the R.N.D. Engineers' dinner at the London Tavern.

M. O. F. E.

London, *November 9th*, 1928.

[Our printer is responsible for the "kW"; when we passed the proofs the line was correct.—EDS. ELEC. REV.]

Published Specifications.

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specification will be printed and abridged and all subsequent proceedings will be taken.

1927.

10,749. "Method of or means for reducing the voltage drop in rectifiers." F. Meyer and H. J. Spanner. September 24th, 1926. (277,929.)

16,056. "Electromagnetic relays and other devices." British Thomson-Houston Co., Ltd., and R. D. Parry. June 16th, 1927. (298,920.)

16,111. "Vacuum tubes." S. G. S. Dicker (Naamlooze Vennootschap Philips' Gloeilampenfabrieken). June 16th, 1927. (298,693.)

16,386. "Facsimile telegraphy." J. L. Baird and Baird Television Development Co., Ltd. June 20th, 1927. (299,076.)

16,510. "Automatic control of dynamo-electric machines." British Thomson-Houston Co., Ltd. July 15th, 1926. (274,470.)

18,920. "Brush-adjusting and switching-devices for electric motors." L. A. Wisler. July 17th, 1926. (274,439.)

18,946. "Telephone systems." Automatic Telephone Manufacturing Co., Ltd., and J. E. Ostline. July 16th, 1927. (298,932.)

19,052. "High-emission thermionic valve." Dr. S. Loewe. July 19th, 1926. (274,507.)

19,054. "Incandescent cathode for electron-discharge tubes." Dr. S. Loewe. July 19th, 1926. (274,509.)

19,167. "Telegraph systems." Western Electric Co., Inc., and Western Union Telegraph Co. July 21st, 1926. (274,871.)

19,172. "Protective gear for alternating-current systems." T. W. Ross and Metropolitan-Vickers Electrical Co., Ltd. July 19th, 1927. (298,994.)

19,173. "Protective gear for alternating-current systems." T. W. Ross and Metropolitan-Vickers Electrical Co., Ltd. July 19th, 1927. (298,995.)

19,184. "Telephone systems." Associated Telephone & Telegraph Co. July 19th, 1926. (274,518.)

19,382. "Acoustic apparatus particularly applicable to telephone transmitters." Electrical Research Products, Inc. October 20th, 1926. (279,390.)

19,398. "Luminous electric discharge tubes." Rainbow Light, Inc. October 20th, 1926. (279,391.)

19,409. "Electrical distribution systems." G. Wilkinson, W. E. M. Ayres, and English Electric Co., Ltd. July 21st, 1927. (299,088.)

19,412. "Thermionic valve circuits." Gramophone Co., Ltd., and B. E. G. Mittell. July 21st, 1927. (299,089.)

19,543. "Incandescent cathode discharge tubes." S. G. S. Dicker (Naamlooze Vennootschap Philips Gloeilampenfabrieken). July 22nd, 1927. (299,098.)

19,545. "Telephone systems." Automatic Telephone Manufacturing Co., Ltd., and J. E. Ostline. July 22nd, 1927. (299,099.)

19,553. "Radio receiving systems." F. J. Rider. July 22nd, 1926. (274,899.)

19,953. "Loud speakers." Dr. G. Seibt (trading as Seibt Fabrik Elektrischer Apparate). August 14th, 1926. (275,962.)

20,186. "Electric conductors." F. A. Becker. July 29th, 1927. (299,112.)

21,489. "Electrostatic device for the reproduction and reception of sound waves." H. Vogt. December 24th, 1926. (282,628.)

22,023. "Wireless loud-speakers." E. G. Craven and A. P. Craven. August 2nd, 1927. (Cognate application 24,641/27.) (299,135.)

22,127. "Magnetic separators." R. Greaves. August 23rd, 1927. (299,136.)

23,607. "Wireless telegraph transmitters." Siemens Bros. & Co., Ltd., and S. E. Long. September 8th, 1927. (299,151.)

23,662. "Electricity meters." Chamberlain & Hookham, Ltd., and S. James. September 8th, 1927. (299,153.)

25,091. "Portable or self-contained wireless receiving apparatus." C. Farrar. September 23rd, 1927. (299,161.)

25,247. "Manufacture and production of electrodes welding-rods, and the like for use in welding and depositing metal." B. Turner and Ferro-Arc-welding Co., Ltd. September 24th, 1927. (299,163.)

26,311. "Voltage regulation of rectifier plants." International General Electric Co., Inc. October 5th, 1926. (278,715.)

26,778. "Electric switches." General Electric Co., Ltd., and P. H. Coales. October 10th, 1927. (299,175.)

26,944. "Articulated nipple or flexible jointing means for electric wires and cables." J. E. Wilmshurst. October 11th, 1927. (Cognate application 3,037/28.) (299,176.)

27,768. "Electric terminals." General Electric Co., Ltd., and R. J. Kaula. October 19th, 1927. (299,182.)

29,382. "Electric condensers." F. A. Borzych. November 3rd, 1927. (299,197.)

29,533. "Methods of and apparatus for sound recording." British Thomson-Houston Co., Ltd. November 13th, 1926. (280,534.)

29,944. "Electrode arrangement for electron discharge tubes." E. Schrack and R. Ettenreich (trading as E. Radiowerk Schrack). June 10th, 1927. (291,775.)

32,772. "Electric-switch structures." British Thomson-Houston Co., Ltd. December 30th, 1926. (282,734.)

33,475. "Means for automatically compensating the voltage drop in alternating-current transmission lines." Siemens-Schuckertwerke Akt. Ges. December 11th, 1926. (282,092.)

35,014. "Electromagnetic key clutch or ratchet clutch." R. Bain and J. Fenton. December 24th, 1927. (299,230.)

35,121. "Methodical connection of the telephone cable circuits with Pupin coils." G. Viard. December 28th, 1927. (299,231.)

35,138. "Electric soldering irons." P. Naumann and K. Weber. December 29th, 1926. (282,801.)

35,483. "Hanger or coupling for use in connection with electric insulators." Steatit Magnesia Akt. Ges. October 26th, 1927. (299,232.)

1928.

519. "Regulating apparatus." Siemens & Halske Akt. Ges. January 7th, 1927. (283,220.)

1,226. "Heat-exchagne apparatus comprising tubes having an electrolytic deposit of metal on the interior thereof." F. G. Martin and W. Ramsay. April 22nd, 1927. (Divided application on 299,071.) (299,100.)

2,708. "Train-controlling systems." Siemens & Halske Akt. Ges. January 27th, 1928. (Addition to 294,444.) (299,240.)

3,051. "Control systems for electric generators." British Thomson-Houston Co., Ltd. January 31st, 1927. (284,610.)

4,609. "Electrical measuring instruments." W. B. Good. February 14th, 1928. (299,247.)

5,484. "Excess-voltage safety devices." Dr. G. Seibt (trading as Seibt Fabrik Elektrischer Apparate) and A. Salomon. May 14th, 1927. (290,582.)

6,898. "Electric resistances." H. A. Gill (Steatit Magnesia Akt. Ges.). March 5th, 1928. (Convention date not granted.) (286,720.)

9,890. "Tripolar circuit-breakers." Allmanna Svenska Elektriska Aktiebolaget. April 19th, 1927. (288,294.)

10,304. "Multiple-bar magnets." F. Quast and A. F. V. Eichert (trading as Berko-Werke Quast & Co.). January 23rd, 1928. (299,264.)

10,711. "Direct current motors operating on the Ward-Leonard system." Rheinische Metallwaarenund Maschinenfabrik. April 12th, 1927. (28,578.)

12,849. "Amplifying or detecting relays." Soc. d'Etudes pour Liaisons Téléphoniques et Télégraphiques à Longue Distance. May 9th, 1927. (Addition to 251,588.) (290,202.)

18,556. "Electrical transformers." Koch & Sterzel Akt. Ges. January 23rd, 1928. (Addition to 295,014.) (299,286.)

21,275. "Rectifiers." International General Electric Co., Inc. July 23rd, 1927. (294,483.)

Trade Mark Applications.

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from November 7th:—

Silex. No. 493,847. Class 6. Electric drills, hammers and grinding machines.—Henri Cuinier, Paris. (British representative: Henry Fairbrother, 30-32, Ludgate Hill, E.C.4.)

Autocycle. No. 493,696. Class 8. Instruments, apparatus, and parts therefor for use in radiotelegraphy and telephony, &c.—F. C. Lea, Shinfield Lodge, Shinfield, near Reading.

Triola. No. 495,080. Class 8. Radio-telephonic and telegraphic apparatus, &c.—Tritone, Ltd., 41, Wigmore Street, W.1.

Elchron. No. 495,567. Class 16. Electric clocks and parts thereof.—L. S. Mayer (London), Ltd., 12, New Union Street, Moorfields, E.C.2.

The Electrical Screening of Dusts.

Preliminary experiments at the Pittsburgh Experimental Station of the United States Bureau of Mines are reported by the Department of Commerce to have shown that by spreading fine dusts of coal and coke of similar composition upon a conducting plate and placing a second plate a certain distance above it, a size separation of the particles is accomplished upon applying between the plates sufficient electrical potential to lift the smaller of the particles to the upper plate. Even when using a relatively crude apparatus for obtaining the required potentials, consisting of an induction coil and key for breaking the circuit, the sizing of the particles is markedly superior to that obtainable by air elutriation. Obviously, before the best results can be expected, a more nearly constant and controllable source of potential (up to perhaps 10,000 volts) than that obtainable with an induction coil must be used. Constant and non-oscillating potentials up to 100,000 volts may be obtained with an electrical system involving the use of three-electrode thermionic valves. The obtaining of dust samples of fixed particle size is a pre-requisite to fundamental research on dust explosions, since the explosibility of dust of a given material depends largely upon particle size.

New Work for Contractors.

Particulars of new works and building schemes for the use of electrical installation contractors in search of work and all interested in the sale of electrical and allied plant and other products.

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

ABERDEEN.—Primary and intermediate schools; clerk, Educational Authority.

ASHFORD (Kent).—Additional housing scheme, with electrical and heating work, for the U.D.C.; W. Bowles, architect.

BATH.—Suite of shops, Coronation Avenue, for the Bath and Twerton Co-operative Society, Ltd.; secretary.

BIRMINGHAM.—Renovation of the Cathedral; clerk to the Chapter.

BLYTH.—Alterations, Central Cinema; T. J. Stephenson.

BRIGHTON.—Reconstruction, 177-8, Western Road (£22,000); borough engineer.

BRISTOL.—Wesleyan church at Sea Mills (£8,000); trustees.

BUCKLOW.—Housing scheme (70) (deposit £2 2s.); R. C. Cordon, engineer and surveyor, 24-26, Station Buildings, Altrincham.

BURNLEY.—Adaptation of premises, 79, St. James Street, for electricity showroom; borough surveyor. Housing scheme (58), Briercliffe Road; borough surveyor.

BURTON-ON-TRENT.—Housing scheme (70 to 80), for the T.C.; borough surveyor. Aerodrome; Corporation and Air Ministry.

CHATHAM.—Four blocks of flats, for the T.C.; R. L. Honey, borough surveyor (returnable deposit of £2 2s.).

CHELMSFORD.—Factory for Robinson, King & British Challenge Glazing Co., Ltd., Marshgate Lane, Stratford, E.

CONNAH'S QUAY.—Council offices for the U.D.C.; F. A. Roberts, architect, Earl Chambers, Mold (returnable deposit of £3 3s.).

CRONBERRY.—School (£6,800), for Ayrshire E.C.; education architect, Ayr.

DERBY.—Bemrose secondary school (£71,746), for the Borough E.C.; George Walker & Slater, Ltd., builders.

DRIFFIELD.—Hospital (£38,105), for East Riding C.C.; county architect, Beverley.

EASTLEIGH.—Science block (£4,475), Derby Road School, for Hants E.C.; director of education, Winchester.

GLASGOW.—Additions to Partick Cinema; Partick Picture House, Ltd. Building for Lambhill Ironworks, Ltd., Lambhill; the manager.

GOOLE.—Housing scheme (50); J. H. Castle, engineer and surveyor to the U.D.C.

HASTINGS.—Alterations, operating theatre, Poor Law Infirmary; H. W. Coussens, architect.

HITCHIN.—Extensions, Boys' Grammar School (£34,000); governors.

HULL.—Orthopædic hospital, Cottingham; city architect. Cinema, Beverley Road and Hyde Road; Eureka Picture Hall, Ltd. Malet Lambert High School; city architect.

ILKESTON.—Town Hall extension; Special Committee. Factory extension, Awsworth Road; A. Booth & Sons.

IRISH FREE STATE (Dublin).—Housing schemes (1,491), for the City Commissioners.

LEEDS.—Reconstruction, Lloyd's Bank, Vicar Lane (£29,217); Paul Rhodes, Ltd. Erection 80 houses and flats on the Middleton Housing Estate (November 20th); specifications from W. T. Lancashire, city engineer, Municipal Buildings; tenders to Town Clerk's Office, Great George Street.

LEEK.—Housing scheme (104), for the U.D.C.; surveyor.

LEWES.—Postal sorting office for H.M. Office of Works, King Charles Street, London, S.W.

LONDON (Ilford, E.).—General hospital (400 to 500 beds), for the London C.C.

(E.C.).—Reconstruction Chief Police Offices, Old Jewry; Police Committee.

(Charlton, S.E.).—Factory extension, Anchor and Hope Lane; United Glass Bottle Manufacturers, Ltd.

(Woolwich, S.E.). Extensions, works, Abbey Wood; Premier Electric Welding Co., Ltd.

(Eltham, S.E.).—41 houses, Cadwallon Road and Thaxted Road; Eaglen Bros. 40 shops with flats, Well Hall Road; John Laing & Son, Ltd.

(Putney, S.W.).—Art room and dormitory block, Froebel Education Institute, Grove Lane; governors.

(Streatham, S.W.).—34 houses, off Sternhold Avenue; B. Utting. Dance hall and shops, Streatham Hill; Treherne and Norman. Cinema, Streatham Hill; G. Coles.

LONDON COLNEY.—Elementary school (£9,000); Herts. county surveyor.

MADELEY.—Senior school for Salop E.C.; director of education, Shrewsbury.

MANCHESTER.—School, Openshaw (£60,000), for the City E.C.; director of education.

MANSFIELD.—Extensions, Brunts School (£11,500); governors.

MEXBOROUGH (Yorks.).—Extensions and alterations to building for Yorkshire Co-operative Bakeries, Ltd.; Chas. F. Moxon, architect, Regent Chambers, 3, Regent Street South, Barnsley.

MITCHAM.—School for mental defectives (£5,201), for Surrey E.C.; W. W. Finny, secretary, Kingston-on-Thames.

NORTHENDEN (Cheshire).—New Church of England; vicar of Northenden.

NORTHFLEET.—Garage for Gravesend 'Bus Services, Ltd., Perry Street; W. Gould.

NOTTINGHAM.—Roman Catholic church, West Bridgford; rector of St. Patrick's.

PLYMOUTH.—25 houses, Browning Road; A. C. Jones & Son.

PRESTON.—Extension of the Isolation Hospital, Deepdale (deposit £2); W. Platt, borough engineer.

RICHMOND (Surrey).—Engine room extensions, with pumping machinery and accessories, for the Main Sewerage Board; William Fairley, engineer, Parliament Mansions, Westminster, S.W. (returnable deposit of £3 3s.).

ROCHESTER.—Extensions, out-patients' department, St. Bartholomew's Hospital (£20,000); secretary.

ST. ALBANS.—Extensions for 400 patients, Hill End Hospital; H. Carter Pegg, architect for Herts. C.C.

ST. HELENS.—Housing scheme (150), Grange Park, for the T.C.; A. W. Bradley, borough engineer (returnable deposit of £2).

SALFORD.—Extensions, Royal Hospital, including laundry and new wing for 80 nurses; joint architects.

SELSDON.—136 houses, Garden Village; Walton Heath Land Co.

SHEERNESS.—Girls' school (£21,600), for Kent E.C.; E. Salter Davies, director of education, Sessions House, Maidstone.

STOURBRIDGE.—Additional 74 houses, for the T.C.; borough surveyor.

SUNDERLAND.—230 houses at Ford, Hylton, Ryhope and Tunstall; R.D.C. surveyor.

SWADLINCOTE.—Re-erection of engine house and fitting shop, electrically equipped, for the Bretby Brick Stoneware Co., Ltd.

TEDDINGTON.—Extensions, chemical research laboratory, for H.M. Office of Works, King Charles Street, S.W. (returnable deposit of £1 1s.).

THORNE (Doncaster).—Additional housing scheme (about 1,000), for the Thorne Colliery Co.

TOTTINGTON (Near Bury).—Alterations to and extension of Tottington Mill; for British Breda Silk Co.

TYLDESLEY-WITH-SPAKERLEY.—Housing scheme (52), Sale Lane site (deposit £1 1s.); F. E. Jones, engineer and surveyor, Town Hall.

WALSALL.—School, Ida Road (£30,000), for the Borough E.C.; director of education.

WALTON-ON-THAMES.—Central school for Surrey E.C.; W. W. Finny, secretary, Kingston-on-Thames.

WATFORD.—Maternity home (£10,000); Herts. C.C. Extentensions, School of Art; S. Dawe, architect. Elementary school, Garston (£17,350); Herts. county surveyor.

WELLINGBOROUGH. — Boys' secondary school for Northants. E.C.; director of education, Northampton.

WEST WICKHAM.—School (£13,740), for Kent E.C.; education architect, Sessions House, Maidstone.

WIGAN.—Tuberculosis block at Wrightington Hall; S. Wilkinson, county architect, 16, Ribblesdale Place, Preston. Housing scheme (160); borough engineer.

WIGTON (Cumberland).—Conversion of factory into artificial silk factory (£20,000); for British Netherlands Artificial Silk Co., Ltd., Trafalgar House, Waterloo Place, London, S.W.1.

WISBECH.—Pea-canning factory and stores, for the Wisbech Produce Canners, Ltd.; F. Burdett Ward, architect, 8, South Brink.

WOKING.—Reception hospital (88 beds), additions to nurses' home, and 12 houses, Brookwood Mental Hospital, for Surrey C.C.; F. J. Hodgson, architect, 201, High Street, Guildford (returnable deposit of £3 3s.).

WORKSOP.—Extensions, Kilton Hill Infirmary, for the B.G. (£6,690); clerk.

YORK.—Additional housing schemes (670), for the T.C.; borough surveyor.